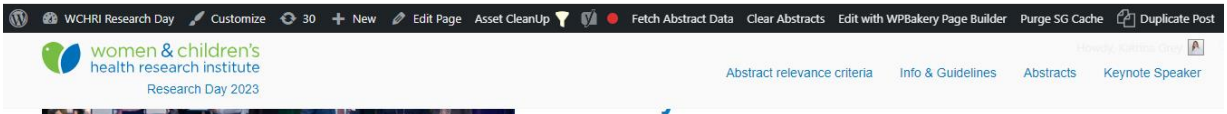
women & children's health research institute



WCHRI is pleased to have hosted our 16th Annual Research Day on October 18, 2023. WCHRI Research Day offers a highly engaged learning and networking environment that showcases trainee research accomplishments in children's and/or women's health research.

Thank you once again to our founding partners, the University of Alberta, Alberta Health Services, the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation, for making WCHRI and this day possible. We're very grateful to have your support and commitment to women's and children's health research.

Thank you to this year's keynote Dr. Bernard Thébaud for his presentation on *Regenerative medicine in perinatal medicine: A bench to bedside story*.

Thank you to our 130 members who volunteered to support Research Day as reviewers, session chairs or judges!

Finally, thank you so much to our trainees for presenting their research!

We are pleased to announce this year's Research Day winners!

Congratulations to all presenters this year!

WCHRI does not provide feedback for this opportunity.

Thanks for attending Research Day 2023!

WCHRI Research Day is an open event where photographs of presenters and attendees are taken.

Questions? Contact wcgrants@ualberta.ca.

Keynote Speaker

We are delighted to announce our keynote speaker for 2023 is **Dr. Bernard Thébaud** of the Ottawa Hospital Research Institute.

His presentation is entitled: "**Regenerative medicine in perinatal medicine: A bench to bedside story**"

Dr. Thébaud is a clinician-scientist with a focus on the clinical translation of stem cell-based and gene therapies for lung diseases. He is a senior scientist with the Ottawa Hospital Research Institute and a neonatologist with the Children's Hospital of Eastern Ontario, providing care to critically ill newborns. He is also a pediatrics professor at the University of Ottawa and a former WCHRI member.

Dr. Thébaud studies the mechanisms of lung development, injury and repair to design new treatments for incurable lung diseases. His focus is on answering clinically relevant questions for translation into real-life applications. He is now translating innovative cell and gene therapies from the lab into patients to improve outcomes.

He has participated on numerous peer review committees and scientific advisory boards at the international, national and provincial levels, including CIHR and NIH. Dr. Thébaud holds the University of Ottawa Partnership Research Chair in Regenerative Medicine and is the Associate Scientist Director of the Stem Cell Network. His research is funded by the Canadian Institutes of Health Research, the Heart and Stroke Foundation of Canada and the Stem Cell Network.

Date: October 18
Time: 1 – 2 p.m.

- 1 – 1:15 p.m. Welcome from our partners
- 1:15 – 2 p.m. Keynote

Location: The Westin Edmonton

Information & guidelines

Promote and network your research with us in-person!

WCHRI Research Day offers trainees under the supervision of WCHRI academic members the opportunity to showcase their research progress. This year, we look forward to interacting with our academic members, their trainees and our funders, the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation in person!

Please access the WCHRI 2023 Research Day Abstract Submission and Registration Form to submit an abstract and to register for the event. Participation at the event is free of charge, but registration is required. Due to the significant costs involved — with funds provided by our generous funders the Stollery Children's Hospital Foundation and Alberta Women's Health Foundation — please only register if you plan to attend.

Please note, the registration deadline is October 11. In-person registration on October 18 is not available.

Click on the section headers below to access information on how to present your research.

- **Program opportunity** +
- **Abstract preparation outline** +
- **Abstract submission** +
- **Abstract allocation** +
- **Research Day presentation formats** +
- **Learning Sessions** +
- **Deadlines** +
- **Acknowledgement** +
- **Access the abstract submission and registration form** +

Program opportunity

Abstracts and presentations are scientific and should be accessible to a broad audience.

- Abstract submissions will be allocated to one of the following presentation formats:
  - 5-minute poster presentation, or
  - 10-minute oral presentation.
- Only abstracts that evidence alignment with WCHRI Research Day abstract relevance criteria are eligible for publication and presentation.
- Presentations are representative of WCHRI's three research themes:
  - children's health and well-being
  - pregnancy and developmental trajectories and
  - lifelong women's health.
- Presentation formats are assigned by the presenter's in-training category, WCHRI research theme, and commiserate with the presenter's engagement in research.

Submission of an abstract to WCHRI constitutes confirmation of the in-training member's availability to present at WCHRI Research Day on October 18.

Research Day presentation formats

WCHRI Research Day presentation formats offer trainees the opportunity to promote and network their research.

Presentations are attended by a broad audience composed of trainees, academic faculty, research staff and our funding partners and their donors.

5-minute poster presentation

Each trainee will be assigned to a poster session and posterboard. WCHRI will provide tacks for presenters to pin their poster to the posterboard. Posters should be standard research poster size 48w x 36h inches (122 x 91 cm). Further instruction and posterboard access timelines will be provided in presenter invitations. Trainees have five minutes to present their research followed by up to five minutes of questions from poster judges. Poster judges may be WCHRI postdoctoral fellows or academic members. Poster judges may attend poster judging paired with a representative from Stollery Children's Hospital Foundation and/or Alberta Women's Health Foundation.

10-minute oral presentation

Each trainee will be assigned to an oral presentation room with up to five other presenters. Presentation slide decks may include dynamic slides. Presenters must load their presentation slide deck on to the presentation room laptop. Instruction and presentation room access timelines will be provided in presenter invitations. Trainees have 10 minutes to present their research followed by five minutes of questions from presentation participants (judges, moderators and/or audience members, including Stollery Children's Hospital Foundation and/or Alberta Women's Health Foundation representatives). Oral presentation session chairs and judges are WCHRI academic members.

Acknowledgement

WCHRI is supported by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation. Without their generous support, our institute would be unable to continue to support the research done by you and your colleagues.

You are required to acknowledge the funding sources that contributed to your research. All research is supported in some way by a financial commitment. If you are unsure of the funding source(s) for your project, please ask your supervisor. All research projects funded by or receiving subsidized research services from WCHRI must acknowledge the support of WCHRI and the appropriate Foundation, including using logo(s) on your presentation slides.

Information on acknowledgement requirements and logo files can be found on our Acknowledgements and logos webpage.

Access the abstract submission and registration form

Access the WCHRI 2023 Research Day Abstract Submission/ Registration Form.

Abstract preparation outline

Before you start your abstract submission, review the submission and completion requirements. Most trainees develop their abstract in a Word document and copy and paste the abstract into the abstract submission form.

The purpose of your abstract is to:

- condense a large amount into a brief and concise summary.
- engage and promote your work with a broad audience.

Why it's important:

- This will determine the format you are invited to present on Research Day.
- Abstracts will be posted on our website, so it will be a chance to build your professional portfolio.

Structure

For the abstract itself, key components include:

- a title
- an introduction
- methods
- results
- conclusion

Abstracts must also include the:

- authors
- acknowledgements and funding sources.

Abstract allocation

All submitted abstracts are:

- Reviewed for relevance.
- Relevant abstracts are allocated to one of the following presentation types:
  - 5-minute poster presentation, or
  - 10-minute oral presentation.
- Relevant abstracts will be published on our website on September 20.

WCHRI will provide notification to all trainees of the outcome of their abstract submission by September 20.

Feedback is not provided for this opportunity.

Deadlines

- Abstract submission for WCHRI Research Day closes **September 7 at 4 p.m.**
- Registration for WCHRI Research Day closes **October 11 at 4 p.m.**

Applications must be submitted to WCHRI using the WCHRI 2023 Research Day Abstract Submission/ Registration Form. Late submissions are not accepted.

Learning Sessions

WCHRI will host two learning sessions to help trainees navigate requirements and expectations for Research Day. The first session is to help you prepare your abstract and the second session offers specific details about the components required to deliver an effective presentation. These sessions are chaired by an academic member and presentations are offered by WCHRI Postdoctoral Fellows.

How to prepare your abstract for WCHRI Research Day

- Event date: July 21, 11:30 a.m. –1 p.m.
- View presentation slides

How to prepare your presentation for WCHRI Research Day

- Event date: September 20, 11:30 a.m.–1 p.m.
- View the presentation slides:
  - 5-minute poster presentation
  - 10-minute oral presentation

Please refer to our events page for further information and to register.

Abstract submission

- Presentations are delivered by the trainee invited to present.
  - Abstracts must be submitted to WCHRI on or before September 7 (4 p.m.).
    - Late submissions are not accepted.
  - Abstract submission is open to in-training members (undergraduate, graduate, fellows and residents) under the direct supervision of a current WCHRI academic member.
    - Submission is not accepted from trainees that hold or are on leave from a faculty position.
  - One abstract submission per trainee maximum.
    - Where the presenter submits more than one abstract, the abstract submitted closest to the deadline date will be accepted.
  - **Submitted information is final and not subject to amendment.**

Trainees are to download the abstract details (PDF document) from the submission confirmation page. This download must be retained by the trainee as confirmation of abstract submission.

Abstract relevance criteria

All abstracts to WCHRI Research Day must align with the following relevance criteria to be eligible for posting on our website and presentation at Research Day.

To establish relevance, all abstracts must clearly address the following:

- The research question must specifically target improving outcomes for women and/or children through health research.
- The primary research question must address the unique and distinct health needs of women and/or children. For example:
  - Stating that a particular disease or risk factor is higher in women or in children is not sufficient rationale; the study must explore why prevalence is higher in women or children.
  - If a study is exploring sex/gender comparisons, the comparison must be embedded as the primary research question, not as a secondary outcome.
- Methodology must clearly demonstrate direct applicability to women and/or children's health outcomes. The applicant must provide rationale for their chosen research model, including factors such as sex and age.

The above items are some common considerations; alternative or additional factors may need to be included.

Contact

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Participant #: 14
Presenter: Megan Wang
Supervisor: Mager, Diana
Title: Markers of Sarcopenia are affected by Chronic Liver Disease and may associated with delayed Motor Function in Infants and Young Children
Authors: Wang Y, Hager A, Pritchard L, Hodgetts S, Mazurak, V, Gilmour SM, Mager DR

Theme: Children's health and well-being

Introduction Malnutrition and sarcopenia (low muscle mass and muscle function) have been recently recognized in children with chronic liver disease (CLD) and are associated with adverse clinical outcomes that may impact health-related quality of life. Diagnosing sarcopenia in infants/young children (≤5 years) with CLD is difficult due to the lack of consistent methods used to measure their muscle mass, muscle function and gross motor skill development. The use of tools such as ultrasonography to measure muscle thickness (MLT) as a surrogate of fat-free mass (FFM) offers the potential to address these limitations. The study purpose is to measure muscle mass, muscle layer thickness (MLT), and motor function, using validated measures in infants and young children (2 months-5 years) with CLD. Methods This prospective pilot study included infants and young children (2 months-5 years) with CLD and healthy controls (CON) recruited from the Pediatric Liver/Liver Transplant Clinics at the Stollery Children's Hospital and the community, respectively. Participants underwent baseline measurements of 1) FFM and Fat mass [FM] using Bioelectrical Impedance Analysis (BIA), 2) MLT and subcutaneous adipose tissue (SAT) of the bicep brachii (BB), rectus femoris (RF), rectus intermedius (RI), soleus, and gastronemius (GN) using ultrasound (U/S), and 3) Gross and fine motor development in CLD only (Peabody Motor Scale V2 [PDMS-2]). Secondary variables collected included demographics (age, sex, CLD diagnosis), anthropometrics (weight z-score (wt-z), height z-score (ht-z), head circumference [hc-z]), nutrition status (Subjective Global Nutrition Assessment [SGNA]), urgency of nutrition care (nutrition acuity), and multiple skinfold thickness (SFT) (triceps [TSF], biceps, suprailiac, subscapular), mid-arm circumference [MAC-z]). Results Preliminary baseline normative data from CLD (n=11, 2.6 ± 1.3 years, 6F/5M) and CON (n=14, 2.7 ± 1.6 years, 7F/7M) are presented. CLD etiology included 80% Biliary Atresia, 20% TPN-related cholestasis. 27% (n=3) CLD are moderately malnourished (SGNA B), indicating increased nutrition risk. No significant differences in age (yrs), sex, wt-z, ht-z, hc-z, MAC-z, TSF-z, subscapular-z were noted between groups ($p>0.05$). Significantly lower total thigh, RI and soleus MLT were observed in CLD compared to CON ($p<0.05$). This was particularly evident in CLD children ≤2 years who had significantly lower total thigh, RI, RF and soleus MLT than CON at baseline ($p<0.05$). In children ≤2 years, U/S measures of increasing thigh SAT were higher in CLD after 3 months ($p<0.05$). Total thigh, RI, RF MLT was positively related to total motor quotient (absolute, percentile) and gross motor quotient scores (absolute, percentile), but not fine motor quotients (absolute, percentile) of the PDSM-2 at baseline ($r2=0.47$; $p< 0.001$). Bicep and calf (MLT, SAT) was not associated with total motor, gross motor or fine motor quotient (absolute, percentile) in children with CLD. Conclusion CLD is associated with lower muscle thickness, fat-free mass and higher subcutaneous thickness, particularly in younger children. Measuring muscle thickness may be informative of body composition and gross motor skill development in children with chronic liver disease.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 22
Presenter: Asna Latif
Supervisor: Bhavsar, Amit
Title: Variations in the TLR4 gene locus informs on susceptibility to cisplatin-induced hearing loss in childhood cancer patients
Authors: Asna Latif, Erika Scott, Abhinav Thakral, Jong Lee, Geoff Liu, Bruce Carleton, Colin Ross, Amit Bhavsar

Theme: Children's health and well-being

Background Cisplatin is an indispensable chemotherapeutic used to treat a wide range of solid tumours. However, it is associated with irreversible hearing loss in up to 70% of paediatric cancer patients. This has significant long-term repercussions on children and affects their learning, language, and social development. It also necessitates lower doses of cisplatin to be administered during treatment, which interferes with cancer therapy regimens. The incidence of cisplatin-induced ototoxicity (CIO) varies from person to person due to a genetic contribution to susceptibility. Potential therapeutic targets have included the Toll-like Receptor 4 (TLR4), which has recently been found to exacerbate cisplatin-induced inflammation and cell death; however, the relationship between TLR4 and genetic susceptibility to CIO is not defined. Objectives Determine the relationship between genetic differences at the TLR4 gene locus and susceptibility to CIO in childhood cancer patients. Methods Candidate studies on the TLR4 gene locus were conducted in pediatric cisplatin-treated patient cohorts to investigate the relevance of single nucleotide polymorphisms (SNPs) in rendering protection from CIO. Subsequent functional analyses in a luciferase reporter system were used to investigate the relevance of these variants in vitro. Results SNPs at the TLR4 promoter in paediatric cohorts (P= 0.0029, OR=0.316 (0.148,0.674)) were associated with protection from CIO. They were also shown to suppress TLR4 upregulation by cisplatin in functional assays. Conclusions TLR4 presents as an important therapeutic and prognostic target that can predict childrens susceptibility to CIO during cancer treatment in order to optimize cancer treatment and minimize the risk of hearing loss in treated patients.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 26
Presenter: Danielle Lysak
Supervisor: Scott, Shannon
Title: Children with medical complexity accessing emergency department healthcare: What can we learn from their parents?
Authors: Lysak, D., Ali, S., Neufeld, S., & Scott, S.

Theme: Children's health and well-being

Introduction: Children with medical complexities (CMC) constitute a growing and disproportionate number of pediatric patients that visit the emergency department (ED). The CMC population has one or more diagnoses that require coordination of multiple specialties. As medical technology improves, CMC are living longer in their communities. However, clinical decompensation may happen quickly and often requires swift intervention in an ED. Parents are often the key source of information, lead care coordinators of their child, and best understand their specific clinical signs predicative of decompensation. While in the ED, parents are both focused on being an expert in their child's care and are simultaneously experiencing a plethora of emotions related to their child's clinical condition. Caregiver burden and burnout are major concerns regarding parents of CMC. Understanding the parent experience in the ED is essential in improving how health care professionals can optimize the outcomes of their children while supporting parents through each encounter. The objective of this patient-oriented study is to explore the information needs and experiences of parents accessing emergency health care for their medically complex child. Methods: This qualitative, observational study will utilize patient-oriented principles and follow Qualitative Description methodology. Parents of CMC will be purposefully sampled to participate in semi-structured interviews via digital interface (Zoom). Potential parent participants are recruited by collaborating with a nurse practitioner-led clinic for pediatric non-invasive ventilation care. Purposive sampling of participants allows us to meet the following eligibility criteria: 1) parent who is eighteen years of age or older of a child less than eighteen years of age 2) parent presented to the ED pursuing care for their medically complex child in the past twelve months from start of data collection; 3) the child is defined as medically complex by their health care provider and/or parent; 4) the parent is fluent in English 5) participants must have access to telephone or Zoom software. Conventional, inductive, content analysis will be exercised to remain close to the data set with low levels of interpretation of interviews. Expected Implications: The literature surrounding CMC and their families is limited within the Canadian context. Analyzing the unique experiences of parents highlights the intersecting factors that create barriers to accessing health care services for these families. Amplifying the perspectives of parents of CMC is a vital first step to understand and address the challenges when accessing the ED. Findings from parent interviews will generate valuable insight to create a future knowledge translation tool aimed to improve outcomes for CMC and their parents accessing the ED. Conclusion: A qualitative approach to understanding the experiences and information needs of parents of CMC accessing the ED is underway to analyze their priorities and perspectives. Currently we are collecting and analyzing data. We are anticipating that participant recruitment, data collection and analysis will be completed in late Winter.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 28
Presenter: Toluwanimi (Tolu) Temowo
Supervisor: Olson, David
Title: Is the fetus involved in initiating its own delivery ?
Authors: Tolu Temowo, Tania Rodezno Antunes, Kelycia B. Leimert, David M. Olson

Theme: Pregnancy and developmental trajectories

Introduction Labor is a complex process, and the trigger that initiates parturition in humans is still a mystery that likely involves fetal signals interacting with maternal physiology. One signal comes from the fetal membranes (hFM). The hFMs release chemokines that attract circulating peripheral maternal leukocytes to invade the uterus. Once adhered to uterine tissues, these leukocytes release proinflammatory cytokines and more chemokines to attract more leukocytes leading to the expression of uterine activation proteins. This inflammatory cascade activates the uterus to become parturient. The question becomes, what stimulates chemokine release from the hFM? One possible signal is fetal pulmonary surfactant, especially its protein components (PS). Human fetal lungs begin producing PS at 24-28 weeks gestation. As the lungs mature, they release PS into the amniotic fluid, which is in direct contact with the hFM. We hypothesize that PS is the initiating fetal signal for parturition, and it activates the hFMs to release chemoattractive molecules. Our objective is to test whether hFM explants incubated with PS alone or with other amniotic fluid components, including arachidonic acid (AA), Interleukin-1 beta (IL-1β), or High mobility group box 1 (HMGB1) protein release more proinflammatory chemoattractive molecules that stimulate leukocyte migration. Planned Methods We will obtain placentas from consenting term non-labouring mothers (TNL; elective cesareans >37 weeks) at the Royal Alexandra Hospital (n=6). The hFMs will be isolated, rinsed, and the explants excised using a 6 mm tissue punch. After 48 h of acclimation, the hFM explants will be incubated for 24hrs with DMEM-F12 (controls), AA (10uM), IL-1β (10ng/ml), HMGB1 (200ng/ml) and PS alone or a combination of these proteins. The specific PSs used in our treatments and their concentrations are SP-A (2.75ug/ml), SP-B (0.5ug/ml), SP-C (1ug/ml), and SP-D (0.25ug/ml). After, we will collect the media (conditioned) and homogenize the hFM explants for our experiments. I will measure the outputs of 3 proinflammatory cytokines (IL-6, IL-1, TNF) and chemokines (CXCL1, CXCL2, CX3CL1) in the hFM explants and conditioned medium samples using multiplex assays. Leukocytes will be isolated from whole blood collected from TNL mothers (n= 6-8). We will measure their migration to the hFM homogenates or conditioned media using a chemotaxis chamber. The chemotaxis chamber has upper and lower wells separated by a membrane containing 3 um pores. The lower well will contain the homogenized hFM while the upper well contains the leukocytes. The leukocytes that migrate to the bottom wells after a 30 min incubation at 37°C are counted. Expected Results We expect PS-treated explants will express and release more proinflammatory cytokines and chemokines than control explants. We also expect significantly more leukocytes to migrate to the homogenates and conditioned media collected from PS-treated hFM explants. The explants treated with amniotic components and PS will stimulate the highest levels of leukocyte migration and inflammatory outputs. Conclusion Understanding what triggers parturition will greatly aid in designing diagnostic tools to predict birth timing and discovering key causes to birth-related issues.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 29
Presenter: Haley Frerichs
Supervisor: Pin, Sophia
Title: The relationship between adverse childhood experiences and endometrial cancer: a scoping review
Authors: Haley Frerichs, Jenna Wowdzia, Allison Sivak, Sarah Chapelsky, Christa Aubrey, Sophia Pin

Theme: Lifelong women's health

Introduction: Endometrial cancer (EC) is the sixth most common cancer in patients with a uterus and the most common gynecologic malignancy in high-income countries. While adequate tools and interventions exist to detect and treat early-stage disease, cases are rising worldwide, most significantly in patients under 40 years old. Further, EC is one of the few cancers in Canada with rising incidence and mortality. One of the most significant risk factors for EC is obesity. While the etiology of obesity is complex and multifactorial, a history of adverse childhood experiences (ACEs) is linked to obesity in adulthood. ACEs include exposure to maltreatment, abuse, household dysfunction, or peer dysfunction before age 18. While ACEs have been linked to other chronic diseases and cancers, the relationship between ACEs and EC has not been well-described. The aim of this scoping review is to explore prospective associations between ACEs and EC. We also aim to investigate the relationship between ACEs and risk factors for EC such as obesity, focusing on potential sex and gender differences in the ACE-obesity relationship. This review will help guide future research on these topics which will help inform clinical practice and prevention strategies for EC. Methods: The scoping review was developed according to PRISMA guidelines. An extensive search was designed with a health sciences librarian using keywords representing ACEs and EC or obesity in people with uteruses. The search was performed across the following databases: MEDLINE (via Ovid), Global Health (via Ovid), HealthSTAR (via Ovid), Embase (via Ovid), Scopus, CINAHL Plus with Full Text (via EBSCO), Web of Science All Databases, and APA PsycINFO (via Ovid). There were no restrictions on the date of publication, language, or country of origin. Additional studies were identified through grey literature searching and citation hand-searching. Search results were uploaded to Covidence systematic review software for de-duplication and screening. Included studies will examine the relationship between ACEs and EC, or evaluate the relationship between ACEs and obesity, specifically in adults with uteruses. Studies focused on adolescents, adults without uteruses, animals, and adverse experiences limited to adulthood will be excluded. Two reviewers are currently screening studies for eligibility, beginning with a title and abstract screen, then a full-text review. Any disagreements will be resolved by consensus. The full-text review will be followed by data charting and synthesis. A charting table was designed in Covidence to extract publication information, participant demographics, and key findings from each study. Study characteristics and findings will be synthesized and narratively summarized. Results: The searches identified 7142 studies and 3994 duplicates were automatically removed, leaving 3148 studies for review. 198 studies were eligible for full-text review and are undergoing screening. As little is currently known about the relationship between ACEs and EC, this scoping review will identify potential associations that may be used to further our understanding of EC risk factors and improve patient care.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 56
Presenter: Yuxin Guo
Supervisor: Mager, Diana
Title: Developing Normative Reference Values to identify Myopenia in Pediatrics within Alberta
Authors: Guo Y, Hager A, Noga M, Alobaidi R, Khaira G, Mager DR, Gilmour SM

Theme: Children's health and well-being

Introduction: Evidence showed that myopenia, or low skeletal muscle mass (SMM), was prevalent in adults and children with chronic diseases. Myopenia has been associated with adverse clinical and long-term outcomes such as rehospitalization, delayed growth, increased morbidity and mortality in children. Early diagnosis and detection of myopenia are critical for interventions to prevent these complications. However, there is a lack of healthy reference values to determine low SMM in young children. The study objective was to develop normative reference values for assessment of SMM to identify myopenia in infants and young children. Methods: This retrospective, single-center study included healthy infants and young children aged under 18 years who underwent investigational abdominal computed tomography (CT) and magnetic resonance imaging (MRI) in the ambulatory appointments and Pediatric Intensive Care Unit (PICU) between 2005-2023. Cross-sectional abdominal CT/MRI scans were retrieved from the pediatric radiology and analyzed for area (in cm2) of skeletal muscles (psoas [PM], paraspinal [PS], abdominal wall muscles [AWM]) and adiposity (subcutaneous [SAT], intramuscular [IMAT], and visceral adipose tissue [VAT]) at lumbar L3 and 4 levels, using Sliceomatic software (5.0 Rev- 5f, Tomovision). All muscle and adiposity area were then corrected for growth differences. Myopenia was defined as total SMM (tSMM; the sum of all 3 SMM muscle areas) z-scores below -2. Regression analysis and cubic spline transformation were performed to generate quantile percentage plots specific to sex and age. Anthropometric (wt, wt-z, ht, ht-z), demographic (age, sex) and clinical data were collected from medical chart review. Results: A total of 229 previously healthy children admitted to the Pediatric Intensive Care Unit and/or ambulatory setting who underwent investigative abdominal CT or MRI between 2005-2023 were reviewed. Of these, a total of 150 were excluded (n=47 had diagnoses indicative of cardiac or liver disease/transplant, n=7 had missing anthropometric data, n=96 for other congenital abnormalities such as achondroplasia resulting in growth failure, unanalyzable scans, and unknown). Abdominal CT/MRI scans of 79 children (39M/40F) years were included. Median (interquartile range [IQR]) age, height, weight, and their z-scores were 2.0 (0.6-7.1) years, 80.5 (66.2-124.5) cm, 11.4 (7.8-24) kg, 0.4 (-1.2-1.5), and 0.5 (-0.4-1.3), respectively. For children below 2 years (n = 40), cut-offs (< -2SD) for total SMM index (SMMI), PM index (PMI), and PS index (PSI) at L3 level were 37.8, 2.9, and 11.2 cm2/m2. For children above 2 years (n = 39), cut-offs for SMMI, PMI, and PSI at L3 level were 32.7, 2.5, and 12.8 cm2/m2. No significant differences in cut-offs for SMMI, PMI and PSI at L3 level were noted between CT and MRI scan determinations ($p<0.05$). Conclusion: Early identification and intervention for myopenia can reduce the risks for developing adverse clinical and long-term outcomes in infants and young children. Establishing cut-offs to identify myopenia is warranted.

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 58
Presenter: Ricardo Suarez
Supervisor: Wine, Eytan
Title: Serum Metabolites Relate to Disease Course in Pediatric Crohn Disease
Authors: Ricardo Suarez, Ben Nichols, Konstantinos Gerasimidis, Gili Focht, Víctor Navas-Lopez, Sibylle Koletzko, Anne M Griffiths, David Wishart, Dan Turner, Eytan Wine

Theme: Children's health and well-being

Introduction: Pediatric Crohn disease (pCD) is a chronic, debilitating gastrointestinal disease with no cure. CD is a highly heterogeneous disease with some patients developing a more complex phenotype over time. This heterogeneity poses significant challenges for clinicians in selecting the most appropriate therapy for individuals. Serum metabolites could reflect patterns linking host immune and gut microbial functions originating in the gut. We believe that exploring these patterns among patients will further our understanding of pCD progression. In this work we use the Pediatric Inflammatory Crohn's MRE Index (PICMI) with detailed serum metabolomic data to explore disease progression over time. Methods: Fifty-six pCD patients were included as a pre-planned sub-study of the multicenter, prospective, ImageKids cohort, which was designed to develop the Pediatric Inflammatory Crohn's MRE Index (PICMI). Children were included at any time of their disease course when undergoing ileocolonoscopy and MRE and followed for 18 months when MRE was repeated. Serum metabolites were identified using liquid chromatography/mass spectroscopy. We then used the PICMI index from each visit (i.e., study initiation at baseline and 18 months follow-up) to identify if patients improved clinical outcomes between timepoints. Any movement in the ordered categories defined by the cutoff values in the total PICMI score (≤10 Remission, 11-55 Mild inflammation, 56-120 Moderate inflammation, and >120 Severe inflammation) was used to define "improving" label (e.g., moving from moderate to mild inflammation from baseline to follow-up). The metabolomic composition from "improving" category was evaluated using Non-metric Multidimensional Scaling (NMDS) according to the Bray-Curtis distance. In addition, we used the Permutational Multivariate Analysis of Variance (PERMANOVA) to test group differences. Results: Results showed a zone of improvement between study initiation at baseline and 18 months follow-up. Moreover, The longitudinal design of our study allowed us to explore change of metabolites in association with disease course. We found that polyamides metabolites are associated with improvement in inflammation. Spermidine, spermine, sarcosine, putrescine are polyamides that are essential for cell homeostasis and have been previously related to regulation of inflammation and modulation of oxidative stress. Conclusion: Metabolomic analysis can provide insight into Crohn disease pathogenesis and help predict disease progression among pCD patients. The association between metabolomics and disease progression might allow a better understanding of changes in host-microbe interactions and introduce new diagnostic or therapeutic options.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 59
Presenter: Mary-Frances Smith
Supervisor: Gokiert, Rebecca J
Title: Nurturing the nurturers: Understanding support systems for early childhood educators in Alberta
Authors: Mary-Frances Smith

Theme: Children's health and well-being

Introduction: Early childhood educators (ECEs) are vital in shaping children's development and are comprised of dedicated women with strong motivations to work with young children. However, these motivations can lead to misconceptions about the ease of managing the responsibilities of caring for multiple children, resulting in low compensation and an expectation of selflessness. Also, many ECEs balance caregiving duties at home and may have multiple jobs due to low pay. Continuous stress impacts ECE well-being, resulting in a rotation of caregivers for children, potentially affecting their attachment. The presumption that ECEs should derive intrinsic joy from their work, regardless of how society perceives their role, diminishes their expertise and the significance of their contributions to children's development. Given the $3.8 billion investment via the Canada-Wide Early Learning and Child Care Agreement to create 45,000 new childcare spaces while persistent workforce retention concerns loom, this research holds relevance. This study aimed to understand what ECEs need to be supported in their roles. Three questions guided the study: 1) What factors contribute to, and barriers detract from, ECEs feeling supported? 2) How do these factors and barriers contribute to long-term workforce retention and stability? and 3) What solutions to workforce retention can be found from the ECE perspective? Methods: To ensure the relevance to women's and children's well-being, I used a community-engaged, qualitative descriptive approach that considered the needs of ECEs. Community-engaged research involves collaboration with the community affected by the issue, integrating their insights and perspectives. The Association of Early Childhood Educators, representing Alberta's ECE community, was the primary partner in this study. I conducted semi-structured interviews with eleven ECEs working in Alberta, exploring their motivations, moments of support, decisions that challenged their role, and how they could advocate for themselves. Results: Preliminary thematic analysis identified social-ecological factors that either facilitate or hinder ECEs from feeling supported. Facilitators mentioned by participants included feeling valued, fair compensation, and collaborative work environments. Conversely, barriers encompass inadequate compensation, high stress levels, and feeling undervalued. Participants emphasized that they are more likely to remain in their roles, ensuring consistent care and nurturing for children when supported. In contrast, those facing barriers are at risk of burnout and turnover. Participants found the interview process empowering and felt that being asked questions and having their perspectives heard demonstrated that they have voice and agency to advocate for themselves, strengthening their commitment to the field. Conclusion: This study provides valuable insights for developing policy recommendations as decisions are being made under the Canada-Alberta Agreement. By recognizing the link between ECE well-being and workforce retention my study has directly supported well-being outcomes for women and indirectly for children. A stable ECE workforce means stable attachments to children under their care.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 67
Presenter: Maya Nagorski
Supervisor: Hemmings, Denise G
Title: The effect of TNF-α on Piezo1 expression and function in human placental trophoblasts
Authors: Maya Nagorski, Rebecca Reif, Kaitlyn Visser, Denise Hemmings

Theme: Pregnancy and developmental trajectories

Introduction Preeclampsia is a hypertensive disorder affecting 3-10% of pregnancies worldwide. This leads to unfavourable maternal outcomes including death, as well as poor fetal outcomes such as premature birth and restricted growth. Though preeclampsia affects many women and children, physiological mechanisms are not definitively known. The disorder is likely linked to dysregulation of the placental trophoblast cells, which differentiate into the fetal-maternal interface known as the syncytiotrophoblast (ST). Our lab previously investigated the cation channel, Piezo1, and found it was upregulated in term placentas from preeclamptic women and in response to TNF-α treatments in placental explants. This may indicate a relationship between the inflammatory response, Piezo1 expression, and preeclampsia. We further explored this relationship in choriocarcinoma BeWo cells which model trophoblasts, and in placental explants which are composed of various cells. We hypothesize that inflammatory factors such as TNF-α increase Piezo1 expression in the placenta, resulting in dysregulated ST differentiation leading to preeclampsia. Methods Term placentas were obtained with consent and dissected to obtain and culture placental explants at the gas-liquid interface. BeWo cells were plated on chamber slides and treated with 20 µM forskolin to induce syncytialization. Both models were exposed to TNF-α (0, 0.01, 0.1, 1, 10 or 20 ng/mL) for 24 hours. Piezo1 localization and expression were determined with immunofluorescent staining relative to number of nuclei, quantified by mean fluorescent intensity (MFI). Results Results from TNF-α treatment of placenta explants (n=3) aligned with our previous study. Piezo1 MFI increased from an average of 0.015 ± 0.016 at 0 ng/mL TNF-α to 0.055 ± 0.036 at 20 ng/mL TNF-α. These results are not yet significant, though a clear trend was seen. Piezo1 was clearly expressed in the trophoblasts, but even more highly expressed in placental blood vessels. TNF-α treatment of BeWo cells (n=3) yielded variable results across trials. The MFI either spiked at 0.1-1 ng/mL TNF-α, or increased across all TNF-α treatments. Conclusion These results support the hypothesis that TNF-α exposure increases Piezo1 expression in placenta explants. The differing results in placental explants and BeWo cells may suggest Piezo1 expression in non-trophoblast cells in explants, as seen in the localized staining in blood vessels. We will next focus on the trophoblasts by co-staining explants with placental alkaline phosphatase (PLAP), a protein made in the ST. To evaluate if TNF-α exposure increases Piezo1 function, we will use the Piezo1 agonist, Yoda1 with and without TNF-α and measure intracellular Ca2+ influx with Ca2+-sensitive dyes. We will evaluate if TNF-α exposure and Yoda1 treatment decreases syncytialization in BeWos or re-syncytialization in explants by measuring human chorionic gonadotropin levels. Changes in protein expression will be confirmed with RT-PCR, ELISA, and Western blotting. This study will establish a relationship between maternal infection-induced TNF-α and overexpressed Piezo1 in the placenta. This overexpression may disrupt ST function, indicating a mechanism for preeclampsia and rationale for clinical research.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 71
Presenter: Wendy Duan
Supervisor: Riddell, Meghan
Title: Characterization of first trimester human decidual progesterone-receptor-positive decidual cells in young vs. advanced age pregnancies
Authors: Wendy Duan, Bethan Wilson, Meghan Riddell

Theme: Pregnancy and developmental trajectories

Introduction: Advanced age pregnancies (AAP) (when a pregnant person is over 35 years old) represent a significant patient group and are associated with higher risk for preeclampsia, intrauterine growth restriction, and implantation failure. During pregnancy, the uterine lining develops into the decidua in a process known as decidualization. The decidua is vital for allowing blastocyst implantation, placental development, and maternal adaptations necessary for pregnancy to continue. One key characteristic of decidualization is vascular expansion and remodelling. Recently, it has been shown that delayed decidualization occurs in AAP mice, driving poor reproductive success and increasing pregnancy risk; however, the effects of AAP on the decidual endothelial cells (EC) and the vasculature are unknown. Decidualization is critically governed by the actions of progesterone binding to progesterone receptors (PR). AAP mice have altered PR expression in decidual stromal cells, hence, altered PR signalling may be a driver of decidual aging. Our single cell RNAseq data has identified a subpopulation of PR-expressing EC (PR+EC) in human decidua and suggested that there may be proportionally fewer PR+EC in AAP compared to young donors. We hypothesize that there are changes in the proportion of PR+EC and PR+ non-EC (NEC) and/or changes in PR expression in young vs. AAP decidual cells. Methods: Human decidual samples of 6-6.5wk gestational age from young (18-25 years old) and AAP (35+ years old) donors were collected for cell isolation. Decidual cell suspensions were obtained via serial collagenase type 2 digestions. Cells were fixed and incubated with antibodies against CD31 (EC marker), CD45 (immune cell marker), and PR. Single cell analyses were conducted using the Attune flow cytometer and FlowJo software. The proportions of PR+EC and PR+NEC were calculated as a percentage from total CD31+ CD45- EC and CD31- CD45- NEC. The mean fluorescence intensity (MFI) of PR (indicative of PR signal intensity) in PR+ EC and NEC were calculated as a geometric mean. Groups were analyzed using a parametric unpaired student's t-test (n=3). Results: The proportion of PR+EC from young and AAP donors was 28.72%±2.69% and 35.11%±2.14% respectively (p=0.14). AAP PR+EC had a 6.5% (p=0.17) increase in MFI compared to young PR+EC. The proportion of PR+NEC from young and AAP donors was 0.08%±0.03% and 0.15%±0.03% respectively (p=0.16). AAP PR+NEC had a 51.6% (p=0.36) decrease in MFI compared to young PR+NEC. There was no significant change in the proportion of EC nor NEC across maternal age groups. Conclusions: Due to high sample variability, our preliminary data shows that there are no significant changes in proportion of PR+EC, proportion of PR+NEC, nor PR expression levels across maternal age. There is a nonsignificant downwards trend in AAP PR+NEC PR expression compared to young PR+NEC, suggesting that age-dependent decidual PR expression may be conserved between species. By better understanding the age-dependent mechanisms that affect decidualization, we can better understand why AAP are associated with higher pregnancy risk. Future directions include increasing the sample number in these analyses and assessing the functional role of decidual PR+EC and PR+NEC.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 78
Presenter: Janan Panchal
Supervisor: Riddell, Meghan
Title: Characterization of Par-3 Expression in Cytotrophoblast Cells of Human First Trimester Placenta
Authors: Janan Panchal, Sumaiyah Shaha, Wendy Duan, Ivan Domingo, Meghan Riddell Department of Obstetrics and Gynecology and Physiology, University of Alberta

Theme: Pregnancy and developmental trajectories

Introduction: The placenta is a pregnancy-specific organ that forms along the uterine wall to sustain pregnancy. It is responsible for the exchange of nutrients, waste, and oxygen between the mother and fetus. Two important cell types that are essential for this function are the cytotrophoblast (CT) and syncytiotrophoblast (ST). The ST is a large multinucleated cell that covers the villous surface of the placenta on the maternal-facing surface. It has endocrine functions and is the primary location of exchange and communication between the fetus and mother. The ST arises from the fusion and differentiation of the mononucleated CT progenitor cells. Poor CT differentiation leads to improper formation of the ST and results in pregnancy complications such as preeclampsia and intrauterine growth restriction (IUGR). CT differentiation is regulated by two Par-3 binding partners: Par-6 and atypical protein kinase C (aPKC). Par-3 is an evolutionarily conserved part of the Par polarity complex alongside Par-6 and aPKC complex in other cell types. In addition, Par-3 can act as a scaffolding protein for regulatory components of the Hippo signalling cascade, which also controls the CT to ST differentiation process. However, the role of Par-3 in ST differentiation and where it is expressed in the human placenta is still unknown. This project aimed to determine the localization and expression pattern of Par-3 in the human placenta to determine whether it is expressed in CTs and could thereby play a role in differentiation. Methods: First trimester human placental tissue with a gestational age of 6 to 12 weeks was fixed and stained with antibodies against Par-3, E-cadherin (CT marker), and Hoechst 33342 (nuclear dye). Triplicate images were taken using confocal microscopy on a Zeiss LSM 700 at 20X. Results: The Par-3 signal was variable across the trophoblast layers of the placenta. Signal was observed in CTs but varied between individual cells. In some cells, Par-3 signal was highly colocalized with E-cadherin junctions, but it was predominantly cytoplasmic in other CT. However, Par-3 expression in the ST was consistently unclear due to high background. Therefore, Par-3 localization in the ST is subject to further investigation. Conclusion: Our results showed that Par-3 has similar localization to Par-6 and aPKC in CTs, suggesting the full Par-complex may be formed in this progenitor population. Additionally, a signal was observed in close proximity to the cell junctions, consistent with its expression pattern in other tissues. Since Par-3 is expressed in CT progenitor cells, it may play a role in CT differentiation as a part of the Par complex and/or by modulation of Hippo signalling. Future directions of study include assessing Par-3 localization in term placenta and elucidating its function in CT differentiation. By understanding the processes that regulate CT to ST differentiation, future work will be able to understand regulatory points that are perturbed in preeclampsia and IUGR, leading to the development of respective treatments in the future.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 79
Presenter: Nazanin Arjomand Fard
Supervisor: Wine, Eytan
Title: Biofilms in the appendix and other non-inflamed sections of the colon in pediatric patients with inflammatory bowel diseases
Authors: Nazanin Arjomand Fard, Michael Bording-Jorgensen, Jesse Webb, Simona Veniamin, Christopher Cheng, Troy Perry, Eytan Wine

Theme: Children's health and well-being

Background and Aims: Biofilms, aggregated bacteria colonizing the extracellular polymeric substances matrix, are associated with the mucosa of inflammatory bowel diseases (IBD) patients with some studies showing a mean density of the mucosal biofilms 2-fold higher in IBD patients than in controls. The appendix, which is a highly immune organ, seems to be involved in IBD pathogenesis. In this study we aimed to evaluate biofilms in the appendix and other non-inflamed regions of the colon in pediatric IBD patients. We hypothesized that biofilms composed of pathobionts in these sections could drive inflammation in IBD patients. Methods: Tissues from the appendix, peri-appendicular region, cecum, and ascending colon (ASC), collected from the resected colons of 9 pediatric IBD patients and one pediatric non-IBD patient, preserved in methanol Carnoy's solution were processed and paraffin embedded. Combined fluorescence in situ hybridization (FISH) for biofilms (probe: EUB338) and immunofluorescence (IF) mucin staining (MUC2) identified biofilms and their location. Biofilm formation capacity of culturable bacteria (identified through 16S DNA Sanger sequencing) from these sections was measured. Interleukin (IL)-8 (pro-inflammatory chemokine) and IL-10 (anti-inflammatory cytokine) expressions were assessed by tissue qPCR. Results: FISH demonstrated biofilms in these sections, in close proximity to epithelial cells. We used a biofilm formation assay to assess the ability of the identified bacteria from these sections to form biofilms, illustrating their potential to colonize and evade host defense and potential antibiotics. We found that Enterococcus avium has a significantly higher ability to form biofilms than the negative control. IL-8 and IL-10 both had the highest expression level in the appendix and peri-appendicular region and the lowest in the ASC among all the patients, suggesting an active immune response. Mechanistic experiments are in progress to investigate the type of bacteria involved in the biofilms and their effects on the gut barrier integrity. Discussion: Biofilms adjacent to the epithelium, especially in the appendix and peri-appendix, could interact with or invade epithelial cells. The elevated chemokine transcript level in the appendix could reflect the recruitment of immune cells to this section following bacterial invasion, resulting in the activation of the immune system. Identifying the bacteria involved in the biofilms and clarifying their characteristics will aid us in developing novel microbe-altering treatment strategies or personalized medicine.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 82
Presenter: Elenna LaPlante
Supervisor: Rosychuk, Rhonda
Title: Examining intersections of First Nations status and female sex in ED presentations in Alberta: A population based study
Authors: Elenna LaPlante, Rhonda Rosychuk, Kimberly Curtin, Lea Bill, Cheryl Barnabe, Bonnie Healy, Brian Holroyd, Patrick McLane

Theme: Lifelong women's health

Introduction. Emergency departments (EDs) serve as a critical first access point for many First Nations (FN) members seeking healthcare. However, it has been demonstrated that ED experiences differ between FN and non-FN patients. These race-based differences may be compounded by gender-based differences, as FN female patients make up a higher proportion of FN ED visits than FN male patients. Despite this, there is insufficient research on FN women's health, and their use of the emergency care system in Alberta. Our objective is to quantify differences in ED visit characteristics for FN female and non-FN female adult patients in Alberta. Methods. Study data was collected from April 1, 2012 until March 31, 2017, creating a 5-year population-based retrospective cohort with health administrative data linked to FN identifying data. Age can significantly impact an individual's experience in the healthcare system, so in order to limit our evaluation of intersections between sex and First Nations status, this project analyzed female adults, aged 18-54 years. Variables include patient characteristics (e.g., age, sex, FN status) and emergency department visit characteristics (e.g., day of week, acuity, hospital admission, diagnosis). Descriptive statistics (e.g., mean, proportion) describe variables for each of the population groups (i.e., FN female and non-FN female patients), and mixed effects modelling statistical analyses were conducted to test for statistical significance because data are clustered by patient and hospital. Even relatively small numerical differences in characteristics of FN compared to non-FN females ED visits may be important reflections of health services disparities, because FN females have relatively greater reliance on EDs for care. Results. Female FN patients made 366,184 (11.5%) of the 3,177,079 adult female ED visits during the study period. FN female patients had higher use of the ED (median 5, [IQR 2, 10]) compared to non-FN female patients (median 2, [IQR 1, 4]) over the five year study period. A higher proportion of FN female visits resulted in admission compared to non-FN female visits (6.0% vs. 4.9%, $p<0.001$). Additionally, FN female patients had a higher proportion of their visits attributed to obstetrical diagnoses (6.3% vs. 5.7%, $p <0.001$), substance misuse/addictions diagnoses (3.9% vs. 3.1%, $p<0.001$), and mental health diagnoses (3.8% vs. 0.9%, $p<0.001$). For obstetrical diagnoses, FN female patients had a higher proportion of visits for supervision of pregnancy, specific diseases complicating pregnancy, and false labor. Conclusion. The intersection between FN status and sex influence use of the ED and this demonstrates the need to specifically examine FN-specific and sex-specific issues in the healthcare system. Additionally, further research is needed on the experience of FN female patients in the primary care system and accessing specialist care, and how these experiences can impact ED use.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 85
Presenter: Reihane Taheri
Supervisor: Proctor, Spencer
Title: Healthy Eating Index score is associated with reduced incidence of cardiovascular disease as well as a lower level of non-fasting remnant cholesterol in the females of Alberta Tomorrow Project
Authors: : Reihane Taheri1, Olivia Weaver2, Ming Ye2, Donna Vine1, Dean Eurich2 and Spencer D Proctor1 1. Metabolic and Cardiovascular Diseases Laboratory, Division of Human Nutrition, University of Alberta. 2. School of Public Health, University of Alberta.

Theme: Children's health and well-being

Introduction: Cardiovascular disease (CVD) continues to be a leading cause of death. Unhealthy diet and non-fasting dyslipidemia are among major risk factors of CVD. From the Alberta Tomorrow Project (ATP) we recently demonstrated that individuals with CVD (in comparison to those without) had a lower fasting low-density lipoprotein cholesterol (LDL-C) but higher non-fasting remnant cholesterol (RC). Dietary recommendations for CVD risk include healthy-diet patterns and increased fish and seafood intake. It has been established that there are sex-related differences in pathophysiology and prognosis of CVD. In this study, we aimed to investigate the relationship of the healthy eating index (HEI) score, dietary n-3 fatty acid intake and blood lipids with CVD incidence in women from the ATP cohort. Methods: The ATP cohort enrolled n=52,769 participants aged 35-69 with no history of cancer between 2000-2015 in Alberta. The present study is a subset analysis of female ATP participants who had dietary and CVD incidence data (n=17,612) with mean age of 49 yrs. HEI-Canada (2005) was used to calculate a score (0-100) for diet quality. The relationship between HEI and n-3 fatty acid intake with non-fasting blood lipids as well CVD incidence were assessed. Results: In our ATP sample (in comparison to those without), women with CVD were significantly older (49.2 vs 54.4 years), had higher BMI (27.9 vs 29.7 kg/m2), a greater intake of carbohydrate (52.1 vs 51.1 %), lower intake of protein (16.2 vs 15.9 %), a lower HEI score (55.4 vs 54.4) and a higher comorbidity score (Elixhauser of 2.3 vs 1.8). The mean intake of n-3 fatty acid (gram per day) and the ratio of n-3 fatty acid to total energy (%) were not significantly different among women with or without CVD. Adjusted logistic regression showed that for every 1 unit increase in the HEI score, the Odds Ratio (OR) of developing CVD decreased by 0.97 (p-v<0.05). However, no significant relation was found between CVD incidence with n-3 fatty acid intake (g/d), n-3 to total energy ratio (%) or n-3 to n-3 ratio (%). This was also the case for quartile analysis. Adjusted multivariate regression in a reduced subset with measured levels of non-fasted lipids (n=5,709) showed a significant inverse association between HEI score and Remnant Cholesterol (coef: -0.006), TG levels (-0.01) as well as non-HDL-C (-0.008) (p-v<0.05). But there was no other beneficial relationship found between HEI score, LDL-C or n-3 fatty acid intake. Conclusion: We found a significant inverse relationship with HEI score and the incidence of CVD in women from the ATP cohort. These relationships persisted with non-fasting lipid biomarkers, including RC (but not LDL-C). No significant relationship was found between n-3 fatty acid intake and CVD incidence. These analyses in an Albertan-based cohort, reinforce the importance of maintaining high nutrient quality in the prevention of non-fasting dyslipidemia and CVD risk. Keywords: Diet, Healthy eating index, n-3 fatty acid, cardiovascular diseases, lipid biomarkers

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 86
Presenter: Manav Batta
Supervisor: Cordat, Emmanuelle
Title: SH-SY5Y cells are a physiologically representative model for congenital myasthenic syndrome research
Authors: Manav Batta, Emmanuelle Cordat

Theme: Children's health and well-being

Introduction The neuromuscular junction (NMJ) is the principal site of physiological signaling involving muscle contraction. Communication at NMJs occurs via the neurotransmitter acetylcholine, which binds nicotinic or muscarinic acetylcholine receptors (AChR), stimulating muscular contraction. ACh is then hydrolyzed into choline and acetate by acetylcholinesterase and choline present in the synaptic cleft is finally transported back into the presynaptic terminal via the high-affinity choline transporter 1 (CHT1). Encoded by the SLC5A7 gene, CHT1 is a member of the Na+/glucose cotransporter family (SLC5). The action of CHT1 at the presynaptic terminal membrane is the rate-limiting step in cholinergic signaling at the NMJ. SLC5A7 gene may be mutated in congenital myasthenic syndrome (CMS). Specifically, substitutions in CHT1 cause the autosomal recessive disorder, CMS type 20, which is characterized by hypotonia, muscle weakness, respiratory difficulties, and developmental delays. Our study examined two compound heterozygous CHT1 mutations identified in an 11-year-old male with CMS type 20: the p.I294T and p.D349N mutations. Previous CMS research has employed HEK 293 cells due to their high transfection efficiency and ease of use. Although HEK 293 cells express some neurologically relevant proteins, they are not physiologically representative of the neuromuscular junction. In contrast, the SH-SY5Y cell line is more representative of motor neurons, particularly after differentiation. We hypothesized that these cells would serve as a better model for CMS research than HEK 293 cells as they are more similar to motor neurons than embryonic cells. Methods We analyzed WT and mutant CHT1 abundance in HEK 293 cells by performing immunoblotting on four independent transient transfections and in three clones isolated from CHT1 WT, I294T and D349N parental cell lines to determine mutant CHT1 abundance in HEK 293T cells. Then, we differentiated SH-SY5Y cells using serum starvation, retinoic acid, and human brain-derived neurotrophic factor. Further, we virally transfected undifferentiated and differentiated SH-SY5Y cells to confirm the phenotype of WT and mutant CHT1 seen in HEK 293 cells. Immunofluorescence microscopy was performed to examine CHT1 localization between the WT and mutant proteins, and beta tubulin 3 was used as a marker of neuronal differentiation. Results The HEK 293 cell results indicate that I294T CHT1 is less abundant than WT CHT1 and that D349N CHT1 is more abundant than WT CHT1 in HEK 293T cells. Differentiated and undifferentiated SH-SY5Y cell experiments also show increased abundance for the D349N mutant, but similar abundance for the I294T mutant despite a different migration profile. Moreover, the microscopy data indicate that CHT1 localization does not differ between WT and mutant CHT1. Conclusion SH-SY5Y cells appear to be a suitable model for CMS type 20 research. Future studies should repeat experiments done in HEK 293T cells in the SH-SY5Y cell model-a more physiologically representative model for CMS research.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 88
Presenter: Courtney Tromburg
Supervisor: Aubrey, Christa
Title: The lived experience of a preoperative weight loss intervention in patients with endometrial cancer and obesity
Authors: Courtney Tromburg, Logan Richard, Sophia Pin, Christa Aubrey

Theme: Lifelong women's health

Introduction: Endometrial cancer is the most common gynecologic malignancy, with a lifetime risk of 2.8% in developed countries. This risk proportionally increases as body mass index (BMI) increases. Definitive management for atypical hyperplasia and low-grade endometrioid endometrial cancer involves surgery. A qualitative study was performed to understand the patient experience, satisfaction, and weight loss maintenance in patients who completed a preoperative weight loss intervention for the optimization of surgical treatment for low-grade endometrial cancer. Methods: Patients ≥ 18 years of age, with pathology-confirmed atypical endometrial hyperplasia or grade 1 endometrial adenocarcinoma, and a BMI ≥ 40 kg/m2 who completed the preoperative weight loss intervention were approached to participate in a single semi-structured phone interview that was audio-recorded and transcribed verbatim. Data was collected, de-identified, and handled using Quirkos 2.3.1™ before undergoing thematic analysis. Thematic saturation was reached after 18 interviews. Results: Eighteen participants with a mean age of 57 years (range 25-75) and BMI of 46.9 kg/m2 (range 41.1-56.0) were interviewed. The most common diagnosis was grade 1 endometrial cancer (n=10; 55.6%), followed by atypical endometrial hyperplasia (n=7; 38.9%). One participant had been diagnosed with grade 2 endometrial cancer (5.6%). Participants identified a lack of endometrial cancer education and awareness; specifically surrounding presentation and risk factors (including obesity), as well as typical patterns of menopause. Themes regarding satisfaction of the preoperative weight loss intervention included: degree of weight loss achieved, motivation to develop healthy lifestyle habits, and prioritizing self-care. Participants described exemplary treatment by healthcare providers who many cited as key and occasionally the sole supports in their cancer journey. Themes regarding limitations of the program centred around accessibility, including cost and availability of the full meal replacement in their communities, limited options to achieve significant weight loss, and difficulty navigating treatment centres. Additionally, many desired long-term follow-up with outlined strategies and trusted resources for weight maintenance and counselling around exercise and diet. Weight gain post-intervention was characterized by concepts of frustration, guilt, and shame. Conclusion: Patients with low-grade endometrial cancer and obesity who participated in this preoperative intervention reported satisfaction with the degree of weight loss achieved and gratitude for the treatment they received from their healthcare providers. Patient-oriented resources are required to address challenges in the accessibility of meal replacement options and to support weight maintenance post-intervention. Targeted public health outreach to enhance awareness of endometrial cancer may expedite patient presentation and subsequent treatment.

This research has been funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 89
Presenter: Areeha Mahal
Supervisor: Hyakutake, Momoe
Title: A survey of cannabis use for analgesia in women with chronic pelvic pain
Authors: Areeha Mahal, Joren Manz, Erin Kelly, Momoe Hyakutake

Theme: Lifelong women's health

Introduction: Chronic pelvic pain (CPP) is a debilitating and complex medical condition, marked as non-cyclical pelvic pain that persists for at least six months. CPP necessitates a multifaceted management approach, wherein pain modulators are needed to alleviate the pain experienced by affected individuals, including cannabinoids. In various studies, cannabis has been shown to reduce pain levels. Additionally, cannabis has illustrated effectiveness in treating chronic pain conditions and lowering the dosing and prescribing of other analgesics, including opioids. Unfortunately, there is currently little literature on the use and efficacy of cannabis in women with CPP. Methods: Patients at the CPP clinic either completed a survey during their clinic visit or were given the choice to complete it at their convenience. The survey questioned their experiences with pain, pain treatments and medications, and cannabis. Results: Of the 98 completed survey responses, 10% reported using cannabis for medical purposes once, 41% reported using cannabis for medical purposes more than once, and 49% reported never having used cannabis for medical purposes. Of the non-users, 50% reported wanting to try cannabis for medical purposes. Among cannabis users, 82% reported pain relief, 82% improved sleep, and 72% reported improved mood. 64% of respondents reported cannabis positively affecting their quality of life. Regarding friendships or social life, 32% reported cannabis having a positive effect, and 64% reported cannabis having no effect. 56% of patients reported side effects, including coughing, dry mouth, light-headedness, and nausea. 42% of those using cannabis reported decreasing their use of other medications. Of these respondents, 62% reduced their use of opioids, and 29% reported decreasing their use of non-opioid pain relievers. Conclusion: A significant number of women use cannabis to manage CPP and related symptoms. Benefits reported in the survey included improvements in sleep, chronic and acute pain, mood, social/family life, and general quality of life. Cannabis should be considered for women suffering from CPP and should be considered as a potential alternative to opioid and non-opioid pain relievers. Further research regarding this area is required and encouraged.

This research has been funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 92
Presenter: Jasmine Kowalewski
Supervisor: Tremblay, Melissa
Title: Rising Voices: Enhancing Indigenous Youth's Mental Health through Activism
Authors: Jasmine Kowalewski, Charis Auger, Melissa Tremblay

Theme: Children's health and well-being

Introduction In Canada, Indigenous youth experience higher rates of adverse mental health conditions compared to their non-Indigenous peers. These inequities have been attributed to the past and ongoing effects of colonialism and historical trauma. As such, the cause of mental health challenges among Canadian Indigenous youth can be considered unique, and researchers have called for specific interventions that address historical trauma. It has been argued that using interventions that address historical trauma can (1) alleviate mental health symptoms and (2) facilitate cultural reclamation. A specific form of historical trauma that is rooted in colonialism is the overrepresentation of murdered and missing Indigenous women and girls (MMIWG), which has greatly impacted Indigenous peoples. However, the extent of the impact on Canadian Indigenous youth and their mental health is less known. The MMIWG March is a major Indigenous-led initiative to combat racialized and gendered violence. This form of activism has been healing for participants, yet there is no research examining the impact of the MMIWG March on the mental health of Indigenous youth. The objective of the current study is to (1) explore the impact of the MMIWG crisis on Indigenous youth, including their mental health, from the perspectives of youth themselves, and (2) begin to understand how the MMIWG March might function as a culturally grounded intervention that addresses historical trauma. Methods The current project adopted a strength-based framework and an Indigenous methodology. The current research also aligns with a community-based participatory approach, where community members are equitable partners throughout the research process. Participants were recruited from a local Edmonton high school which annually attends the MMIWG March and represents the community partner for this study. Participants included students (n=8) who attended the 2023 March and self-identified as Indigenous. After the March, a blending of a Western focus group and an Indigenous sharing circle was held at the school. The conversation was audio recorded, transcribed, and analyzed using thematic analysis. The thematic analysis involved the data being organized, coded, and translated into themes. Participants aided the data analysis to align with a participatory approach and to ensure cultural appropriateness and accuracy. Results Data analysis is ongoing. Preliminary themes reflect Resiliency, Healing, and Personal Growth. Culture and community play a role in empowering Indigenous youth to adapt and thrive amidst adversity. In addition, the MMIWG March has emerged as a catalyst for personal growth. The March pushes Indigenous youth out of their comfort zone, leading to new transformative experiences and self-realizations. Conclusion The current study can offer insights into the effectiveness of Indigenous activism as a community-based intervention. Findings can also guide policymakers and mental health practitioners toward culturally appropriate interventions that address historical trauma and promote healing within Indigenous communities. Note: Data analysis will be completed before the WCHRI Research Day.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 93
Presenter: Chentel Cunningham
Supervisor: Scott, Shannon
Title: Exploring Parents' Information Needs and Experiences Caring for a Child with Heart Failure: A Qualitative Descriptive Study
Authors: Cunningham, C., NP MN PhD Student; Zahoui, Z., BScN student; Conway, J., MD MSc; & Scott, SD., RN PhD

Theme: Children's health and well-being

Introduction Childhood heart failure places an enormous burden on North American Health care systems each year. Improved outcomes for this complex health condition have resulted from earlier clinical recognition, advanced treatment strategies and healthcare provider knowledge sharing. As a result, many children affected by heart failure are now being discharged home. Discharge is stressful for parents due to the volume of complex medical knowledge they need to understand and assimilate in such a short period. Research has identified that few existing educational tools exist for parents. Furthermore, no published studies exist exploring parents' experiences and information needs in this context. This highlights that knowledge translation strategies targeting parents are lacking. The first objective of this research was to explore and identify parents' information needs and experiences caring for a child with heart failure. The second objective is to apply this knowledge to design a digital, arts-based knowledge translation tool about childhood heart failure specifically tailored to parents' information needs. Methods Qualitative description provided a rich, minimally interpretative method to explore parents' information needs and experiences caring for a child with heart failure. Parent participants were recruited from a single major pediatric tertiary cardiac care center in Edmonton, Alberta. Interviews were conducted using Zoom technology employing a semi-structured interview format. Two researchers used qualitative content approaches; NVivo software was used for data management. Data collection and analysis occurred iteratively until data redundancy was achieved. Ethics was obtained through the University of Alberta Ethics Board. Results Eleven parents from various ethnic backgrounds were interviewed (6 female, 5 male). The average length of interviews was 50 minutes. Underlying cardiac disease included six dilated cardiomyopathy, two ischemic cardiomyopathy, two congenital heart disease and one hypertrophic cardiomyopathy. Five major categories were identified, with subcategories nested within each category. Three categories relate to parent information needs: factors hindering parental information uptake, current sources of knowledge, and preferences for future education information. Two categories relate to parent experience: riding the emotional rollercoaster and the hard reality of parenting a child with heart failure. Conclusion This research provides the first insights into parent information needs and experiences are caring for a child with heart failure. This knowledge is key to developing educational tools that are tailored to parent learning needs. An educational tool is currently being designed based on these key findings.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 94
Presenter: Marwa Ramsie
Supervisor: Schmolzer, Georg M
Title: Development of novel vasopressor therapy during neonatal resuscitation
Authors: Marwa Ramsie, Po-Yin Cheung, Tze-Fun Lee, Megan O'Reilly, Georg M. Schmölzer

Theme: Children's health and well-being

Introduction At birth, 0.1% of term infants and up to 15% of preterm infants receive cardiopulmonary resuscitation (CPR) including chest compressions and the vasopressor epinephrine (adrenaline). Despite receiving CPR, approximately one million of these newborns will die annually. Even with successful resuscitation, newborns receiving CPR in the delivery room have a high incidence of mortality (41%) and severe short and long-term neurologic sequalae. Epinephrine (adrenaline) is currently the only vasopressor recommended during neonatal resuscitation by the International Liaison Committee on Resuscitation. The inability to predict which newborns are at risk of requiring resuscitative efforts at birth has prevented the collection of large, high-quality human data as to its efficacy for this indication. Vasopressin may be an alternative to epinephrine as pediatric and adult studies suggested that is more effective if cardiac arrest was due to asystole, which is the main cause of cardia arrest in newborn infants. This study aimed to determine the optimal dosage of vasopressin for neonatal resuscitation using a neonatal piglet model. We hypothesized that vasopressin compared to epinephrine will decrease time to return of spontaneous circulation (ROSC). Methods Piglets (n=8 per group) 1-3 days of age were anesthetized, intubated via a tracheostomy, and ventilated. After a stabilization period of 60 minutes, piglets were randomized to receive one of the following vasopressin (0.2U/kg, 0.4U/kg, 0.8U/kg) or epinephrine (0.02mg/kg) doses intravenously. Measurements of rates of ROSC and time to ROSC, survival after ROSC, hemodynamic, and blood gas changes were collected. Results Baseline parameters were similar between all groups. Median (IQR) time to ROSC was 172(103-418)s, 157(100-413)s, 122(93-289)s, and 276(117-480)s for 0.2, 0.4, 0.8IU/kg vasopressin, and 0.02mg/kg epinephrine groups, respectively (p=0.59). The number of piglets that achieved ROSC was 6(75%), 6(75%), 7(88%), and 5(63%) for 0.2, 0.4, 0.8IU/kg vasopressin, and 0.02mg/kg epinephrine, respectively (p=0.94). The epinephrine group had a 60% (3/5) rate of post-ROSC survival compared to 83% (5/6), 83% (5/6), and 57% (4/7) in the 0.2, 0.4, and 0.8IU/kg vasopressin groups, respectively (p=0.61). Conclusions Vasopressin may be an alternative to epinephrine in neonatal resuscitation when cardiac arrest was due to asystole. Time to and incidence of ROSC were not different between all vasopressin dosages and epinephrine. However, non-significantly lower time to ROSC and higher post-ROSC survival in vasopressin groups warrant further investigation.

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 98
Presenter: Thanh-Tu Pham
Supervisor: Lou, Edmond HM
Title: Reliability of the Measurement of Hip Displacement in Children with Cerebral Palsy from 2D Ultrasound Images
Authors: Thanh-Tu Pham, Lawrence H. Le, John Andersen, Edmond H. Lou

Theme: Children's health and well-being

INTRODUCTION: Hip displacement is prevalent in children with cerebral palsy (CP). The severity of hip displacement is defined by Reimers' migration percentage (MP) measured on an anteroposterior (AP) pelvis radiograph. As hip displacement develops silently, detection and monitoring of its progression require periodic radiography, which exposes children to ionizing radiation. Ultrasound (US) has demonstrated its feasibility in imaging hip displacement via a phantom study. This clinical study aimed to determine the repeatability of the US method and the reliability of MP measurements from US hip images. METHOD: Recruitment: Ethics approval, parental consents and children's assents were obtained prior to participation. Children aged 4-16 years old with a diagnosis of CP were included. Data acquisition: Participants laid down in a supine position with both legs in neutral rotation. On each hip, two US scans were acquired, namely coronal and transverse, using a wireless US scanner. The coronal images were obtained by placing the US scanner at the lateral side of the hip and moving anteroposteriorly. The transverse images were collected from the anterior hip with the US scanner placed perpendicular to the coronal plane and scanned in the superior-inferior direction. Forty-three hips were scanned repeatedly (scan 1 and scan 2) for both coronal and transverse images for the repeatability study. Extra 15 hips with only one coronal and one transverse scans were added to the measurement reliability study. MP-US measurement: To calculate the MP, the distance between the acetabular margin and the lateral femoral head (A), and the width of the femoral head (B) were required. MP is defined as the percentage ratio of A/B. From the coronal US images, A could be obtained directly, and from the transverse US images, B could be estimated. An in-house software was developed to semi-automatically extract A, B, and MP. Assessment: Rater 1 (R1) obtained MPs from scan 1 twice (R1[S1,T1] and R1[S1,T2]) and from scan 2 once (R1[S2,T1]). A second Rater (R2) acquired the MPs from scan 1 once (R2[S1,T1]). The repeatability was assessed using MPs from R1[S1,T2] and R1[S2,T1]. The intra-rater reliability used the MPs from R1[S1,T1] and R1[S1,T2] while the inter-rater reliability compared the MPs between R1[S1,T2] and R2[S1,T1]. Intra-class correlation coefficient (ICC[2,1]) with 95% confidence interval, mean absolute difference and standard deviation (MAD±SD), and standard error of the mean (SEM) were used. RESULT: 34 subjects (23M, 11F, aged 8.9±3.1 years old) with 58 hips were scanned. The MPs from R1[S1,T2], R1[S2,T1], and R2[S1,T1] were 24±14%, 22±14%, and 21±15%, respectively. The ICC for the repeatability study (n=43) was 0.90 (0.82-0.94). The ICCs for the intra-rater and inter-rater reliability (both n=58) were 0.94 (0.90-0.97) and 0.76 (0.62-0.85), respectively. The (MADs, SEMs) for the repeatability, the intra-rater and inter-rater reliability were (4.6±3.7%, 0.6%), (3.3±3.7%, 0.5%), and (6.0±6.1%, 0.8%), respectively. CONCLUSION: This study showed that the US has offered a safe and reliable method of measuring hip displacement. The accuracy of the measurements on US images will be further studied prior to applying the developed method in clinics.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 101
Presenter: Si Ning Liu
Supervisor: Bourque, Stephane
Title: Enhanced liver mitochondrial function in the hyperacute phase of neonatal sepsis
Authors: Si Ning Liu, Forough Jahandideh, Jad-Julian Rachid, Claudia Holody, Alyssa Wiedemeyer, Hélène Lemieux, Kimberly Macala, Stephane Bourque

Theme: Children's health and well-being

Introduction: Late-onset sepsis (LOS) is the dysregulated host response to an infection that occurs in the neonate after 72h of life. Sepsis is characterized by a disturbance to metabolic homeostasis and hypoperfusion that could lead to multi-organ dysfunction. At the center of metabolic homeostasis, the mitochondrion is a critical hub for energy production and signaling via the production of reactive oxygen species. Even though investigating the mitochondrial response to LOS in the developing neonate may seem intuitive, it has yet to be explored. Objective: We sought to explore the effects of LOS on mitochondrial function in the developing liver. Methods: Three-day-old Sprague Dawley pups received an intraperitoneal injection of fecal slurry (FS, 1.0 mg/g body weight) or vehicle (5% dextrose). All pups received buprenorphine for pain control immediately after injection of FS, and antibiotics with fluids after 4h and 16h. Pups were euthanized at 4h, 8h, and 24h. Liver mitochondrial respiration was determined by high resolution respirometry. Remaining liver and other tissues were flash frozen for biochemical assays. Results: FS caused 30% mortality in septic pups. By 24h, FS reduced pup bodyweight by -9.5% ($P<0.0001$) and -14% ($P<0.0001$) in males and females, respectively. Interestingly, absolute liver weights were unaffected by sepsis. Plasma ALT levels increased 8.4-fold ($P<0.0001$) by 24h. At 4h, LOS was associated with increased mitochondrial respiration, including through the NADH pathway (+62%, $P=0.004$) and succinate pathway (+65%, $P=0.005$) in males, and these differences persisted at 8h ($P<0.0001$ for all outcomes). Similar outcomes were seen in septic females. Despite increased mitochondrial function, increased mitochondrial content was only observed at 8h in both sexes ($P=0.001$), suggesting that the increased mitochondrial function was not due to increased content. No change to complex IV respiration was observed at 4h or 8h in either sex. By 24h, a -32% reduction in NADH pathway ($P=0.03$) and -41% reduction in complex IV ($P=0.02$) respiration was observed in septic males compared to their respective controls, but no such changes were observed in septic females relative to controls. Increased mitochondrial respiration also increased liver ATP content by 37% at 4h ($P=0.0006$) and 36% at 8h ($P=0.02$) in both sexes despite no changes in ATP synthase protein expression; thus, ATP synthase was not a limiting factor in ATP production. Total AMPK protein expression increased by 2.0-fold and 1.5-fold at 4h and 8h, respectively, in both sexes. Expression of H_2O_2-producing gene (Sod2) was upregulated 10-fold ($P<0.0001$) while H_2O_2-removing genes (Cat, Gpx1, Gsr) were downregulated in septic pups by 24h, suggesting the accumulation of H_2O_2 for bacterial killing. Conclusion: Enhanced mitochondrial function was observed in the hyperacute phase of LOS, specifically in the hours before the most severe manifestations of sepsis (post-8h). Despite enhanced mitochondrial function, signs of liver stress and damage were evident in the recovery phase, and the mechanism underlying these changes remain unknown. The specific cell types responsible for the increases in mitochondrial activity is still under investigation.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 102
Presenter: Rebecca Molberg
Supervisor: Davidge, Sandra
Title: Effects of prenatal hypoxia and a placental antioxidant treatment on the mitochondria in fetal hearts
Authors: Rebecca Molberg, Paulami Chatterjee, Anita Quon, Raven Kirschenman, Floor Spaans, Sandra Davidge

Theme: Pregnancy and developmental trajectories

Introduction: Exposure to low oxygen environment in utero (prenatal hypoxia) increases the risk of cardiovascular disease in adulthood. We previously showed that prenatal hypoxia impairs cardiac function in adult male and female offspring, but the effects and mechanisms in fetal life are not well understood. Mitochondria are the powerhouse of the cell and crucial to the developing heart. Mitochondrial dynamics, the union (fusion) and division (fission) of mitochondria, maintains normal mitochondrial function. However, if prenatal hypoxia impacts mitochondrial dynamics in fetal hearts is not fully understood. Moreover, we previously showed that a placental antioxidant treatment (nMitoQ) during hypoxic pregnancies improved adult offspring cardiac function, but if nMitoQ treatment also impacts fetal cardiac mitochondrial dynamics, is not known. We hypothesize that prenatal hypoxia impairs mitochondrial dynamics in fetal hearts in a sex-specific manner, and that this is improved by nMitoQ treatment. Methods: Pregnant Sprague-Dawley rats were injected with a single i.v. dose (100 µL) of saline or nMitoQ (125 µM) on gestational day (GD) 15 and exposed to normoxia (21% O2) or hypoxia (11% O2) from GD15-21 (term=22 days, n=4-6 dams/group, n=1-3 fetus/sex/dam). On GD21 dams were euthanized and fetal hearts were isolated and stored. Mitochondrial dynamics were assessed via Western blot analysis of the expression of markers of fusion, Mitofusin 1 and 2 (MFN1 and MFN2) and Optic Atrophy 1 (OPA1), and markers of fission, Dynamin-related protein 1 (DRP1) and mitochondrial Fission protein 1 (FIS1). Data were analyzed using two-way ANOVA and post-hoc Fisher's LSD (significance: $p \leq 0.05$). Results: In male hearts, prenatal hypoxia increased OPA1 ($p=0.0306$) and tended to increase MFN2 ($p=0.0652$) compared to normoxia, without effects of nMitoQ. There were no changes in expression of MFN1, DRP1, or FIS1 between the groups in male fetal hearts. In female fetal hearts, MFN1 was higher in prenatal hypoxia vs. normoxia offspring ($p=0.0497$), without effect of nMitoQ. OPA1 expression was higher in hypoxia female hearts ($p=0.0383$) and was decreased by nMitoQ in the hypoxia group ($p=0.0190$). There were no changes in MFN2 expression in female fetuses. DRP1 was higher in hypoxia ($p=0.0346$) and reduced by nMitoQ in the hypoxia group ($p=0.0313$) compared to normoxia female hearts. FIS1 was lower in hypoxia females vs. controls ($p=0.0438$) and was further decreased by nMitoQ in hypoxia females only ($p=0.0114$). Conclusion: Prenatal exposure to hypoxia increased mitochondrial fusion in male fetal hearts, which can contribute to mitochondrial repair and may increase efficiency. In female fetal hearts, hypoxia increased both fusion and fission. Excessive increases in the mitochondrial cycle of fission and fusion may lead to dysfunction in mitochondrial dynamics and negatively affect fetal heart function. However, the increased cycle of fission and fusion may also be adaptive in a stressful situation like hypoxia. The effect of the placental nMitoQ treatment was sex-specific, as it improved mitochondrial dynamics in females only. Thus, prenatal hypoxia impacts mitochondrial dynamics in fetal hearts, which can be prevented in female fetuses by a placental antioxidant treatment.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 105
Presenter: Aislinn Ganci
Supervisor: Parent, Eric C
Title: The intra- and inter-evaluator reliability of coronal plane vertebra displacement measurements on spinal ultrasound images of adolescents with idiopathic scoliosis
Authors: Janie Pollard, Aislinn Ganci, Eric Parent, Brianna Fehr, Thi Nhu Nguyen Nguyen, Edmond Lou

Theme: Children's health and well-being

Introduction Adolescent Idiopathic Scoliosis (AIS) is a three-dimensional (3D) structural disorder of the spine with a lateral curvature >10o, sagittal spine deviation, and transverse vertebral rotation. AIS affects 2 to 4% of adolescents. 3D Ultrasound (3DUS) imaging is a radiation-free alternative to radiography to measure spinal alignment including apical vertebral translation (AVT) and coronal balance. AVT and coronal balance measures clinically inform treatment and quantify alignment outcomes in those with AIS. AVT refers to the lateral deviation of an apical vertebral body relative to the central sacral line. Common radiography standing positions demand arm elevation, yet differing arm positions may impact measurement reliability. 3DUS measurement reliability has not been established for common standing radiograph positions. We aimed to establish the intra- and inter-evaluator reliability of AVT, inter-apical distance, and coronal balance measurements from 3DUS images. Methods Healthy and AIS female volunteers were recruited from email advertisements and a scoliosis clinic, respectively. Participants underwent 3DUS scans in ten positions: standing; arms anteriorly supported at 60° of shoulder flexion; fingers to clavicle, chin, zygomatic process, and eyebrows; shoulders abducted 90° and hands open with thumbs on shoulders; hands on anterior wall with and without blocks; and hands unsupported. Custom software was utilized to obtain measurements. The center of laminas (COL) had been labelled previously for each vertebra to obtain curve angle measurements which have demonstrated excellent reliability. To assess the reliability of coronal displacement measurement procedures, new evaluators marked the lateral position of the midpoint of the COL for each apex vertebra and of T1 relative to the central vertical line (CVL) centered at L5. The distance between the apical vertebra most translated to the right and to the left was recorded as the inter-apical distance. The distance between T1 and the CVL was recorded as the coronal balance. Intra-and inter-evaluator reliability (ICC 2,1) with standard error of measurement (SEM) were obtained from scans measured twice by an evaluator blinded to their first measurements (one week apart), and on a first occasion by three evaluators, respectively. Results Forty-four females (27 with AIS and 17 healthy) had a mean age, height, and weight of 16.8±4.4 years, 163.1±5.9 cm, and 56.1±10.8 kg, respectively. Fourteen participants had a single curve and thirteen had a double curve with a mean maximum curve angle in the standing position of 29.2°±4.4 and 25.5°±3.4, respectively. AVT, inter-apical distance, and coronal balance measurements satisfied the criteria for intra- and inter-evaluator reliability for individual use (ICC>0.90; all were 0.99 or above). For all measurements, the intra- and inter-evaluator SEM was below 0.89mm and 1.12mm, respectively. Conclusions Excellent reliability can be achieved with the proposed measurement procedures and software for coronal plane vertebral displacement measurements of AVT, inter-apical distance, and coronal balance from 3DUS images in all 10 standing positions investigated.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 106
Presenter: Tamara Dorfman
Supervisor: Scott, Shannon
Title: The development of a knowledge translation tool addressing the psychosocial health of children and adolescents living with congenital heart disease and their primary caregivers
Authors: Tamara L. Dorfman, MN, RN, NP, Mandy Archibald, PhD, RN, Mark Haykowsky, PhD, FACC, FAHA, FACSM, and Shannon D. Scott , PhD, RN, FCAHS, FCAN

Theme: Children's health and well-being

Introduction: The chronicity of congenital heart disease (CHD) comes with significant psychosocial consequences for both children and adolescents living with CHD and their primary caregivers. Children and adolescents living with CHD undergo multiple traumatizing invasive surgical and medical procedures, struggle with disabilities resulting from their CHD, face unfair scrutiny and marginalization, and are at risk for mental health issues. Primary caregivers of children and adolescents living with CHD deal with increased stress, fear, anxiety, depression, and financial burden. The objective of this research is to develop a parental knowledge translation (KT) tool which creates an awareness of the potential psychosocial consequences faced by children and adolescents living with CHD and their primary caregivers and available interventions and strategies to help mitigate these consequences. Methods: This research is multi-phased with the results of one phase informing the next. In phase 1, Arksey & O'Malley's framework will be used to conduct a scoping review to determine: the negative psychosocial consequences experienced by children and adolescents living with CHD and/or their primary caregivers; factors contributing to the development of these consequences; and available interventions to help decrease these consequences. Studies will be screened by two independent reviewers by title and abstract and then full text against predefined inclusion and exclusion criteria. Quality analysis will be conducted on all included studies. Data (e.g., study design, intervention type, outcomes, etc.) from all eligible studies will be extracted and synthesized into evidence tables to examine potential patterns. In phase 2, an integrated KT approach will be used to explore the negative psychosocial consequences experienced by children and adolescents living with CHD and/or their primary caregivers and factors contributing to the development of these consequences. A mixed methods approach (i.e., semi-structured interviews and surveys) will be used to create an in-depth description of the experiences and information needs of primary caregivers of children or adolescents living with CHD. Thematic analysis will be used to analyze qualitative data and bivariate and multivariate statistical analysis will be used to analyze quantitative data. Results: The results from phase 1 and 2 will be used to co-create a KT intervention (e.g., arts-based video) with parents of children living with CHD on the Stollery Children's Hospital Pediatric Cardiology Family Centered Care Team. In phase 3, the usability of the KT intervention will be evaluated using a Likert survey. Caregivers of a child living with CHD will be surveyed and bivariate and multivariate statistical analyses will be conducted. Conclusion: Developing a KT tool with its end-users (i.e., parents of children living with CHD) will increase the likelihood that the tool developed is easy to understand and useable for the target population. The purpose of this KT intervention is to provide caregivers of children and adolescents living with CHD with the knowledge and strategies they may need to navigate the psychosocial consequences the child or family may face daily due the CHD and its treatments.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 107
Presenter: Jasmine Gill
Supervisor: Pin, Sophia
Title: Recurrence Risk in Endometrial Cancer Post Robotic Hysterectomy; an Institutional Review
Authors: Sean Zhu, Ericka Wiebe, Sunita Ghosh, Jasmine Gill, Ananya Beruar, Zainab Al Habsi, Sophia Pin

Theme: Lifelong women's health

Introduction: Endometrial cancer is the most common gynecologic malignancy in developed countries and early stage disease usually offers a good prognosis. The current standard of care for disease confined to the uterus involves a minimally invasive approach for a hysterectomy, bilateral salpingo-oophorectomy, and possible sentinel lymph node dissection to improve peri-operative outcomes. During the procedure, either a uterine manipulator or vaginal probe may be utilized to optimize exposure of the surgical field and perform the surgical incision of the vagina, known as colpotomy. Surgery is then followed by observation, adjuvant radiation and/or systemic therapy. Despite optimal treatment, there is a subset of patients who will ultimately recur, which is associated with a poor prognosis. Given the limited data at this time, we aimed to review and identify the factors associated with recurrence among patients following laparoscopic surgery. Methods: A retrospective chart review was conducted on patients treated in Edmonton, Alberta who underwent primary robotic assisted laparoscopic surgery from January 2012 to December 2019. Identified cases of recurrence were matched to controls of similar age, histology, and stage for final analysis. Results: Among 1247 patients, 164 cases of recurrent disease were identified and matched to 150 controls. With multivariate logistic regression analysis, serous and non-endometrioid histology was associated with a significant risk of recurrence (OR 3.06, 95% CI: 1.28- 7.34, $p = 0.01$ and OR 3.63, 95% CI: 1.44 - 9.12, $p < 0.01$ respectively). Presence of lymphovascular space invasion (LVSI) in both the multivariate and univariate analysis was significant (OR 3.40,95% CI 1.75 - 6.58, $p < 0.01$ and OR 2.94,95% CI 1.76 - 4.91). Age and lymph node involvement (Stage IIIC1 and IIIC2) were significant in the univariate but not multivariate model with age > 65 and evidence of nodal disease (OR 2.63, 95% CI: 1.26 - 5.48 and OR 4.0, 95% CI: 1.25 - 12.76 respectively). Uterine manipulator use at the time of surgery was significant in the univariate but not multivariate model (OR 1.67, 95% CI: 1.021 - 2.719, $p = 0.041$). Conclusions: Our analysis demonstrates that LVSI is a risk factor for recurrence following laparoscopic surgery. Serous and non-endometrioid histology was also associated with an increased risk of recurrence. Age, lymph node involvement and use of a uterine manipulator at the time of surgery are additional risk factors and require further investigation.

This research has been funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 108
Presenter: Sophie Lalonde-Bester
Supervisor: Vine, Donna
Title: Elevated Risk for Eating Disorders in Polycystic Ovary Syndrome: A Scoping Review of Prevalence and Etiology
Authors: Sophie Lalonde-Bester, Mahua Ghosh and Donna Vine

Theme: Lifelong women's health

Introduction: Polycystic ovary syndrome (PCOS) is the most common endocrine-metabolic disorder affecting 10% of females across the lifespan. Eating disorders (EDs) are psychiatric conditions that may impact the development of PCOS and its co-morbidities including obesity, metabolic syndrome, and type 2 diabetes. EDs have been reported in PCOS, but there remain limited studies on the causes and the types of EDs in this population. The aim of this scoping review was to determine the prevalence of EDs and disordered eating patterns and to understand the etiology of EDs in PCOS. Methods: Studies published up until June 5, 2023 were searched for in the databases PubMed, Scopus, PsycINFO, and CINAHL. Abstracts were screened and full texts were reviewed by five reviewers. Studies were included if they independently identified the prevalence of an ED in PCOS or measured eating behaviours in those with PCOS and if they reported outcomes related to eating disorders. Original studies in English with human subjects were included. Results: After screening 2,863 abstracts and reviewing 73 full texts, 38 studies met inclusion criteria. Of the 38 included studies, 22 were case control, nine were cross-sectional, three were cohort, two were trials, and two were meta-analyses. A total of 15 tools were used across studies to identify EDs, which included structured interviews, self-administered questionnaires, chart review or self-reported diagnosis. The prevalence of any ED in those with PCOS varied widely from 0%-62%. Those with PCOS were 3-6-fold more likely to have an ED compared to controls without PCOS. Women with PCOS had 30% higher odds ratio of having bulimia nervosa and were 3-fold more likely to have binge eating disorder compared to controls. The prevalence of anorexia nervosa and other specified feeding or eating disorder (such as night eating syndrome) were not reported to be higher in PCOS. No studies reported on avoidant/restrictive food intake disorder, rumination disorder, or pica in PCOS. Strong associations between overweight, body dissatisfaction and disordered eating were observed in PCOS. The etiological development of EDs in PCOS remains unclear however psychological, genetic, and metabolic pathways are implicated, with dysregulation of the hypothalamic-neuroregulation of appetite and satiety playing a large role. Conclusions: Individuals with PCOS have a higher prevalence of eating disorders, especially binge eating disorder and bulimia nervosa, due to unique psychological, metabolic, and endocrine factors. Screening of all individuals with PCOS for EDs is recommended. Early identification and safe management of an eating disorder may prevent significant negative impacts on co-morbidity development in those with PCOS. High-quality studies on the prevalence, pathogenesis of specific EDs, relationship to co-morbidities, and effective interventions to treat ED in those with PCOS are needed.

This research has been funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 111
Presenter: Keatton Tiernan
Supervisor: Storey, Kate E
Title: Through the Lens of Leadership: Using photovoice to explore Indigenous youth mentors' perspectives of their leadership skill development.
Authors: Keatton Tiernan, Genevieve Montemurro, Leah J. Ferguson, Tara-Leigh McHugh, Kate Storey

Theme: Children's health and well-being

Introduction: Initiatives serving Indigenous youth must center the voices of youth. One such program is the Indigenous Youth Mentorship Program (IYMP), which is a youth-centred community-based healthy living program that promotes wholistic wellness and Mino-Bimaadiziwin/miyo-pimâtisiwin ("living the good life"). Offered in communities across Canada, IYMP is based on a communal mentorship model whereby Indigenous high school students (youth mentors) deliver programming for their elementary-aged peers. IYMP is guided by leadership circles, including a Youth Advisory Circle composed of dedicated Indigenous youth from across Canada (aged 15-25) affiliated with IYMP. It is well documented that adolescent leadership experience is linked to improved lifelong health behaviours (e.g., increased physical activity, nutrition, education, and employment). However, we are only now beginning to understand the impact of leadership skills gained through IYMP on the wholistic wellness of youth mentors. In March 2023, the IYMP's Youth Advisory Circle held their first meeting in Winnipeg, MB, where, for two days, 22 youths from across Canada came together and shared their dreams for IYMP and their community. The Youth Advisory Circle identified the need for more relevant and engaging leadership training and resources for youth mentors. Thus, our objective is to capture youth voice by exploring youth mentors' perceptions of the leadership skills gained by being an IYMP mentor and examine if and how they apply those skills. Methods: This research takes a community-based participatory research approach. We will use purposive sampling to recruit seven to ten youth mentors from IYMP's Youth Advisory Circle to elicit their perspectives on leadership skill development within the mentor role and if and how they apply those skills. Based on previous work with IYMP youth, this sample size is appropriate to achieve our objective. Focused ethnography will be used as the guiding method, and data will be generated using photovoice and post-interview field notes. Photovoice poses a guiding question and asks participants to take ~25 photos to answer it. Participants then select one to three pictures and are interviewed to describe and contextualize their selection as it relates to the guiding question. The interview guide is being developed in partnership with IYMP leadership. Photos, interview transcripts, and field notes will be analyzed using thematic analysis. Results: Data generation has yet to occur; however, based on past work with IYMP youth mentors, we anticipate results will provide rich insights into the mentorship experience, skills gained, and the contexts in which their skills are most used and needed. Conclusion: Little is known about youth mentors' perceptions of their leadership skills and their use of those skills. An improved understanding of mentor leadership will help inform the development of more specific and relevant training and other supports. Importantly, mentors have been advocating for their work with IYMP to be credited toward completing a secondary school diploma or equivalent. In line with the overall goal, the research findings will inform the creation of a Canada-wide IYMP-specific accredited course.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 112
Presenter: Maria Sharkova
Supervisor: Hocking, Jennifer
Title: Understanding the mechanism of length regulation in photoreceptor microvilli
Authors: Maria Sharkova, Erica Chow, Constantin Mouzaaber, Chazz Meszaros, Jennifer Hocking

Theme: Children's health and well-being

Introduction Babies born with Usher Syndrome Type 1 have severe hearing loss and balance problems. As a terrible disease progression, they develop vision loss starting at about age 10. Mutations in USH1 genes result in degeneration of the retinal light-sensing cells, rod and cone photoreceptors. However, the cause of photoreceptor loss in these children is unknown, thereby obstructing the search for a cure. Photoreceptors have a large sensory ending, the outer segment (OS), which is a modified cilium precisely tailored to capture light. Surrounding the OS and accommodating several USH1 proteins are photoreceptor microvilli or calyceal processes (CPs) - fine finger-like protrusions with a core of actin filaments. Despite the close association between CPs and the OS, our knowledge of CP development, structure, and, above all, functions remains elusive. Photoreceptors cannot regenerate, but the OS undergoes constant renewal through growing proximally and shedding portions distally. We hypothesize that CPs maintain alignment and integrity of the OS during the renewal process; in USH1, CPs are disrupted, which leads to destabilization of the OS and eventual photoreceptor death. Methods In this project, we use zebrafish as a model to investigate the structure and function of CPs and the contribution of USH1 proteins to CP and OS stability. Zebrafish have a retina highly homologous to the human macula. We performed confocal imaging of immunostained eye sections of the zebrafish retina for visualization. Mutant fish were generated using CRISPR-Cas9 mutagenesis. Tol2 transgenesis was used to introduce overexpression. Actin expression was induced by heat shock. Results Although CP length is comparable between rod and cone photoreceptors, there is a stark difference relative to the respective OS height, suggesting some cells may be more reliant on CPs and prone to disruption. Indeed, rods have relatively short CPs and typically degenerate before cones in Usher Syndrome. Moreover, we observed no change in CP length upon light adaptation, contrastingly to previous reports in fish. Finally, when analyzing the localization of induced tagged actin, we observed that CPs feature highly dynamic cores. Next, we inspect OS response to modified CP length. Our lab previously observed the actin crosslinker and USH1 protein, Espin (USH1M), colocalizing with CP actin in developing and adult fish. Microvilli in other tissues lengthen upon overexpression of Espin and shorten with loss of Espin. We generated an Espin mutant fish and created a cone photoreceptor-specific construct for an overexpression phenotype. We will examine the effect of aberrant Espin expression on CP length and OS morphology across different ages and photoreceptor subtypes. Moreover, we will perform electroretinograms to test visual function. Conclusion In summary, our characterization data suggest that CP length is precisely regulated. Our next goal is to explore the role of Espin, one of the proteins organizing CP actin bundles, in retinal development and homeostasis. As children with mutations in Espin suffer from photoreceptor loss, this project will uncover possible causes of degeneration and options for intervention to prevent vision loss in USH1.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 113
Presenter: Aspen Lillywhite
Supervisor: Lebeuf, Simone
Title: Evaluating documentation of e-cigarette use by medical learners: A Retrospective Chart Review
Authors: Aspen Lillywhite Simone Lebeuf Karen Forbes Elizabeth Hicks

Theme: Children's health and well-being

Background: The adolescent psychosocial history, HEADS history (Home, Education, Activities, Drugs/substance use, Sexuality/suicidality) or SHADES history (School, Home, Activities, Drugs/substance use, Emotions/eating/depression, Sexuality), provides the medical care team with potentially important information relevant to the primary concern that an adolescent may not be comfortable sharing in front of their guardians, and an opportunity for healthcare providers to provide anticipatory guidance. E-cigarette devices represent a concerning trend in substance use among adolescents with many health implications. Appropriate screening and documentation of e-cigarette use is important but is not always done. There are currently no studies exploring the frequency of e-cigarette documentation by medical learners, nor the reasons for the lack of documentation. The objective of our study is to ascertain if and how often medical learners (i.e. medical student, junior resident, or senior resident) ask questions regarding e-cigarette use during the HEADS history when assessing adolescent patients at time of admission to hospital, and if the documentation differs by learner category. Methods: A retrospective chart review is being performed on the admission history of all patients between 12 and 17 years of age admitted to the general pediatric inpatient clinical teaching unit (CTU) teams at the Stollery Children's Hospital with a length of stay exceeding 24 hours from January 1, 2021, and June 30, 2022. Extracted data includes whether or not a confidential adolescent psychosocial HEADS history was performed at the time of admission to the general pediatrics service, whether or not smoking history was documented, whether or not vaping was specifically documented (as a part of the smoking history), whether the patient had any respiratory symptoms or diagnosis, and the level of the learner documenting the admission history and physical examination. Descriptive statistical analysis will be used to address the study questions following chart review completion. Results: Thus far, four-hundred thirty-four charts have been pulled and seventy-seven charts have been reviewed for adolescent patients admitted to the hospital for medical reasons. This study is ongoing, and the remaining charts will be reviewed. For those charts reviewed, seldom is a complete HEADS history documented. Only 3 had a complete HEADS history documented, and only 2 of the 77 charts reviewed documented e-cigarette use. Conclusion: The preliminary results of our study reveal concerning trends in e-cigarette use documentation. Our study will fill an existing gap in the literature and lay the foundation for determining the potential reasons for the lack of documentation and provide important information to develop curricular changes to address this gap.

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 114
Presenter: Joshua Li
Supervisor: Carson, Valerie
Title: Psychometric Properties of a Virtual Physical Literacy Assessment Protocol for Preschool-aged Children
Authors: Joshua Li1, Morgan Potter1, Madison Boyd1, Ramiah Moldenhauer1, Yeongho Hwang1, Jayleen Hills1, Patti-Jean Naylor2, Ryan E. Rhodes2, Sam Liu2, Jean Buckler2, and Valerie Carson1

Theme: Children's health and well-being

Introduction: Physical literacy is a pillar of life-long physical activity participation and subsequent health. The preschool years are a pivotal stage for the development of physical literacy. A virtual protocol to assess physical literacy in preschool-aged children during COVID-19 was developed using existing tools that measure specific physical literacy components (i.e., fundamental movement skills (FMS) and motivation/enjoyment). The primary objective of the study was to examine the psychometric properties of the virtual physical literacy assessment protocol. Methods: Baseline data was used from the PLAYshop randomized controlled trial, which explores a parent-focused physical literacy intervention for early childhood. Participants included 130 preschool-aged children (3-5 years) and their parents from British Columbia and Alberta. At baseline, five FMS (overhand throw, underhand throw, horizontal jump, hop, one leg balance) were measured via a recorded virtual Zoom meeting using the Test of Gross Motor Development - Third Edition (TGMD-3) and the Movement Assessment Battery for Children-Second Edition (MABC-2) tools. All TGMD-3 skill videos were scored by one rater and 10% (n=13) of videos were scored by a second rater. Motivation/enjoyment was assessed via parental-report using four items from the Preschool Physical Literacy Assessment (PrePLAy) and child-report using an adapted Five Degrees of Happiness single-item Likert scale for children. Additionally, children's accelerometer-derived physical activity and age were measured. Intraclass Correlation Coefficients (ICCs), Cronbach's alphas (α), and Spearman's rank correlation coefficients (rs) were calculated. Results: Inter-rater reliability for TGMD-3 FMS ranged from ICC=0.96-0.99. Internal consistency reliability for TGMD-3 FMS was α=0.59 and for parental-reported motivation/ enjoyment was α=0.71. For convergent validity, total physical activity was significantly positively correlated with all FMS (rs0.20-0.24), except horizontal jump. For motivation/enjoyment, a significant positive correlation was observed between moderate- to vigorous-intensity physical activity (MVPA) and the parental-report measure (rs=0.23). For construct validity, age was significantly positively correlated with all FMS (rs=0.27-0.62) but not motivation/enjoyment. Conclusions: Findings indicate initial support for the PLAYshop program virtual physical literacy assessment protocol. However, FMS may need to be considered separately instead of combined into a total FMS score. The validity of the child-report measure of motivation/enjoyment was not found. Keywords: Physical literacy, pre-school, fundamental movement skills

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 116
Presenter: Jordyn M. Cox
Supervisor: Nagpal, Taniya
Title: Edmonton Obesity Staging System in pregnancy: a scoping review
Authors: Jordyn M. Cox, Emily Bonisteel, Ximena Ramos-Salas, Kristi B. Adamo, Taniya S. Nagpal

Theme: Pregnancy and developmental trajectories

Introduction Obesity is often measured by body mass index (BMI), however, the recent Canadian Adult Obesity Management Guideline (CAOMG) emphasizes the limitations of this approach. Obesity is defined as a chronic disease characterized by excess or dysfunctional adipose tissue that impairs health; a complex definition like this cannot be measured by a body size metric like BMI alone. The Edmonton Obesity Staging System (EOSS) is a five-stage system of obesity classification that considers the metabolic, physical, mental and social impacts of excess or dysfunctional adiposity. The CAOMG recommends using the EOSS as a comprehensive tool to assess obesity and obesity-related co-morbidities rather than BMI alone, however, this has not been effectively translated to prenatal care. The majority of prenatal recommendations for care continue to rely on BMI (e.g., gestational weight gain recommendations, screening for gestational diabetes). We sought to synthesize the evidence currently available on using EOSS in pregnancy and health outcomes to inform future directions including developing a comprehensive obesity measure for pregnancy care. Methods A scoping review was conducted using The Preferred Reporting Items for Systematic Reviews and Meta-Analyses Scoping Review Extension. The literature search was carried out in August 2023. Inclusion criteria were: studies focused on human pregnancies and used EOSS in any way. The keywords, 'EOSS' and 'Pregnancy' informed a search strategy that was carried out in Pubmed, Web of Science, Proquest Theses and Dissertations. Data were extracted and mapped to summarize studies that have used EOSS in pregnancy, including outcomes and comparisons with BMI. Results The search resulted in 1869 articles, four of which were eligible and included in this review. The following outcomes were assessed with EOSS: high-risk cesarean delivery, birthweight and gestational age at delivery, adverse outcomes including preeclampsia and maternal death along with predicting pregnancy after fertility treatments. Overall, EOSS was successful in predicting perinatal outcomes and complications however, the predictive value of EOSS is more evident in stages 3-4. When compared to BMI, EOSS more clearly delineates a subpopulation of pregnant individuals who are at a higher risk of cesarean delivery and better-predicted pregnancy rates after fertility treatments. Higher EOSS stages were associated with increased rates of adverse maternal outcomes compared to individuals without obesity classified as stage one. Conclusion Despite favourable results showing that EOSS may be a helpful tool to appropriately care for pregnant individuals who have obesity and identify those who may need closer monitoring for complications, research has been scarce. Further studies are needed, especially in comparison to BMI. In addition, EOSS may be more pertinent than BMI to diagnose obesity before pregnancy and this may support offering fertility treatment and preconception care to populations requiring increased monitoring or treatment, however further research is needed. Given the emphasis on using EOSS in adult populations to properly diagnose and care for obesity, investigating whether this tool is applicable to use in pregnancy is warranted.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 120
Presenter: Emma Elder
Supervisor: Davidge, Sandra
Title: A high cholesterol diet during pregnancy impairs uterine artery function in rats
Authors: Emma Elder, Amanda A. de Oliveira, Amy Wooldridge, Raven Kirshenman, Anita Quon, Floor Spaans, Christy-Lynn Cooke, Sandra T. Davidge

Theme: Pregnancy and developmental trajectories

Introduction: Hypercholesterolemia in pregnancy is a physiological process required for normal fetal development. However, excessive pregnancy-induced hypercholesterolemia increases the risk of vascular pregnancy complications, such as preeclampsia. Hypercholesterolemia decreases nitric oxide (NO) production and increases the formation of peroxynitrite, which impairs vascular function. Peroxynitrite forms when NO reacts with superoxide (oxidative stress). NO is a vasodilator that is critical for the necessary increase in blood flow during pregnancy. Uterine arteries, the vascular bed responsible for blood flow to the uterus/placenta, depend on NO for proper vascular function. Still, whether excessive pregnancy-induced hypercholesterolemia affects NO availability in uterine arteries is unknown. Hypothesis: Excessive pregnancy-specific hypercholesterolemia impairs vasodilation responses in uterine arteries, by reducing NO production and increasing the formation of peroxynitrite. Methods: Sprague Dawley rats were fed a standard chow diet (CD) or high cholesterol diet (HCD; 2% cholesterol + 0.5% cholic acid) from gestational day (GD)6 to GD20 (term = 22 days; n=10). On GD20, uterine arteries were assessed using wire myography to evaluate vasodilation responses to methacholine (MCh) in the presence or absence of L-NAME (a pan-NO synthase inhibitor). In addition, segments of the uterine arteries were snap-frozen for molecular analysis. Expression of endothelial and inducible NO synthase (eNOS and iNOS, respectively) was measured using Western blotting. NO and ROS levels were evaluated using DAF-FM and DHE staining, respectively. NOX2 (an enzyme that produces superoxide) and nitrotyrosine (a marker of peroxynitrite formation) production were assessed using immunofluorescence. Data were analyzed with Student's t-test and two-way ANOVA with Sidak's post-hoc test (significance: $p<0.05$). Results: HCD during pregnancy impaired vasodilation responses to MCh in uterine arteries at the end of pregnancy, whereby at higher doses, MCh caused arteries from the HCD group to constrict instead of dilate ($p<0.0001$), which was not observed in the CD group. L-NAME reduced maximum vasodilation responses to MCh in both groups ($p<0.0001$), but the NO contribution to vasodilation (difference between control and L-NAME curve) at higher MCh doses was significantly less in the HCD group ($p=0.0066$). In addition, compared with CD animals, uterine arteries from HCD dams had reduced eNOS expression ($p=0.0466$) and lower NO levels ($p=0.0389$). No differences were observed in iNOS, NOX2, nitrotyrosine, and ROS levels. Conclusion: Exposure to an HCD during pregnancy impaired vasodilation responses to MCh in uterine arteries at the end of gestation. In addition, uterine arteries of HCD dams had reduced NO levels, which appeared to be due to decreased eNOS expression, but not peroxynitrite formation (via reaction with superoxide). In conclusion, excessive pregnancy-specific hypercholesterolemia reduces NO bioavailability in uterine arteries, which may contribute to impaired uterine artery function. Since proper uterine artery function is critical to maintain a healthy pregnancy, reduced NO levels may lead to the development of pregnancy complications, including preeclampsia.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 121
Presenter: Amanda Almeida de Oliveira
Supervisor: Davidge, Sandra
Title: A high cholesterol diet during pregnancy impairs later-life maternal vascular function in carotid arteries via activation of Toll-like receptor 4
Authors: Amanda A. de Oliveira, Amy Wooldridge, Emma Elder, Murilo E. Graton, Raven Kirschenman, Floor Spaans, Christy-Lynn M. Cooke, Sandra T. Davidge

Theme: Lifelong women's health

Introduction: Hypercholesterolemia in pregnancy is a physiological process required for normal fetal development. In contrast, excessive pregnancy-induced hypercholesterolemia predisposes the mother to vascular pregnancy complications such as preeclampsia, which is a risk factor for later-life cardiovascular diseases (including stroke). However, the underlying mechanisms are unclear. The carotid arteries supply blood to the head, and carotid artery dysfunction may contribute to the increased risk of stroke after preeclampsia. Toll-like receptor 4 (TLR4) is a transmembrane receptor modulated by high cholesterol levels, but whether TLR4 activation plays a role in vascular dysfunction after pregnancies complicated by excessive pregnancy-induced hypercholesterolemia is unknown. Hypothesis: Pathological pregnancy-specific hypercholesterolemia impairs later-life maternal vascular function in carotid arteries via activation of TLR4. Methods: Sprague Dawley rats were fed a control diet (CD) or high cholesterol diet (HCD) from gestational day 6 to 20 (term pregnancy = 22 days; n=10-12). After pregnancy, all dams received a CD. Three months after pregnancy (equivalent to ~10 years in humans), carotid arteries were isolated, and vasoconstriction capacity to phenylephrine (Phe, adrenergic agonist) was assessed using wire myography. We focused our studies on vasoconstriction to Phe as adrenergic signaling is a key pathway controlling carotid artery blood flow. To assess different mechanisms that can modulate vasoconstriction, experiments were conducted in the presence or absence of CLI-095 (TLR4 inhibitor), L-NAME (pan-nitric oxide synthase [NOS] inhibitor), meclofenamate (pan-prostaglandin H synthase [PGHS] inhibitor), and NS398 (selective PGHS2 inhibitor). Data were summarized as the maximum responses (Emax). The statistical tests applied were Student's t-test or two-way ANOVA with Holm-Sidak's post-hoc test (significance: $p<0.05$). Results: HCD during pregnancy increased vasoconstriction to Phe in carotid arteries three months after pregnancy compared to CD ($p=0.012$), which was prevented by ex vivo incubation with CLI-095 ($p=0.0053$), suggesting a role for TLR4. In addition, meclofenamate ($p=0.0430$) and NS398 ($p=0.0315$) also prevented the increased vasoconstriction to Phe in carotid arteries of the HCD group. L-NAME increased vasoconstriction to Phe in both groups (CD: 5.1-fold and HCD: 3.66-fold; $p<0.0001$); however, this modulation was significantly less in the HCD group (delta Emax between CD and HCD, $p=0.0216$). Conclusion: Exposure to an HCD, only in pregnancy, induced carotid artery dysfunction (i.e., increased vasoconstriction) three months after the insult. The enhanced vasoconstriction was mediated via TLR4, likely by reducing the nitric oxide modulation of Phe-induced vasoconstriction and activating PGHS2. In summary, pregnancies complicated by excessive pregnancy-specific hypercholesterolemia are associated with long-term impaired carotid artery function, and TLR4 activation is involved in this process. Thus, TLR4 may be a target for future therapy development to reduce the burden of cardiovascular diseases, including stroke, in women who had pregnancies complicated by pregnancy-specific excessive hypercholesterolemia.

This research has been funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 122
Presenter: McKayla Kirkpatrick
Supervisor: Storey, Kate E
Title: Mapping experiences: Understanding pathways to course credit awarding for high school-aged Indigenous youth mentors across Canada
Authors: McKayla Kirkpatrick, Keatton Tiernan, Genevieve Montemurro, Kate Storey

Theme: Children's health and well-being

INTRODUCTION The Indigenous Youth Mentorship Program (IYMP) is a healthy living program that engages Indigenous youth to promote healthy behaviours, wholistic wellness and "the way of the good life" (Mino-Bimaadiziwin/miyo-pimâtisiwin). IYMP takes a communal mentorship approach and has been offered in over 50 communities across Canada. IYMP is delivered by Indigenous high school youth mentors for elementary students and typically runs once a week. Students share healthy snacks, play games, and build their community of peers. IYMP mentors are guided by IYMP Community Champions, Knowledge Keepers and Elders and have the opportunity to develop essential skills such as leadership, build relationships, and gain employability skills. Mentors also benefit from opportunities to earn course credits toward their high school diploma. Awarding high school credits for IYMP can directly benefit youth and supports IYMP's sustainability. However, how school communities can award high school credits for programs outside of traditional courses is not well understood and may vary across school communities. Therefore, the purpose of this research aims to map feasible pathways for awarding high school course credits to IYMP mentors and explore cases where the awarding of course credits for IYMP has been attempted. METHODS Qualitative inquiry will be used to explore high school course credit awarding in IYMP communities located in Alberta and Manitoba. Document analysis will be used to understand the policies and procedures currently in place to guide the high school credit awarding process. Data will be generated through the collection of course-related documents and content analysis will be used to interpret findings. Specific codes, categories, and patterns will be identified to extract meaning from the data. Documents will be collected from open access sources and a systematic search strategy will be developed in partnership with University of Alberta Librarians. Qualitative description and use cases (i.e., unique credit awarding scenarios within school communities) will explore credit awarding in practice. Use cases will investigate the experiences of awarding credit to IYMP mentors in communities from the perspective of key informants. Key informants are educators involved in awarding credit to IYMP mentors. Participant observations, field notes, and semi-structured interviews will generate data. Content analysis will be used to interpret data and NVivo software will support data organization. RESULTS Together, document analysis and qualitative description through use cases will provide a rich understanding of the steps necessary for IYMP credit awarding. Results will map the potential pathways that IYMP communities can utilize to award mentors with course credit for their involvement in the program. This work is in the planning stages and is anticipated to occur in early 2024. CONCLUSIONS By understanding the available pathways for awarding credit to youth mentors, this research can aid IYMP communities in pursuing credit awarding in ways that suit their community and benefit their students. Key findings will be compiled and shared with IYMP communities as narrative summary reports to synthesize the credit awarding pathways identified in this study.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 123
Presenter: Zorica Nakevska
Supervisor: Fu, Yangxin
Title: Investigating the role of RNA cytosine methyltransferase NSUN2 in ovarian cancer
Authors: Zorica Nakevska, Farzaneh Afzali, Zhihua Xu, Holly Zhao, Guihua Zhang, DuPreez Smith, Rui Zhe Yang, Helen Steed, Lynne-Marie Postovit, Cheng-Han Lee, YangXin Fu

Theme: Lifelong women's health

Introduction Epithelial ovarian cancer (EOC) is the leading cause of death related to gynecologic cancers. Current treatments for advanced EOC are ineffective, necessitating novel therapeutic strategies. RNA modifications, including 5-methylcytosine (m5C) mediated by the NSUN family of RNA methyltransferases (NSUN1-7), regulate the functions of all species of RNAs. Among this family, NSUN2 methylates the most diversified RNA targets and regulates mRNA level and/or mRNA translation in the cell and is implicated in a variety of cancers. However, the role of NSUN2 in EOC remains elusive. Our findings thus far suggest that NSUN2 plays a pro-tumorigenic role in EOC. However, the underlying mechanisms remain to be determined. The objective of this study is to further define the role of NSUN2 on the behavior of EOC cells and the underlying molecular mechanisms. Methods We knocked down the expression of NSUN2 in various EOC cell lines using a lentivirus-mediated shRNA approach and then analyzed the effect of NSUN2 knockdown on cell growth (the neutral red uptake assay) and colony formation (clonogenic assay). We also created NSUN2 knockout models in EOC cells via CRISPR/Cas9 editing and performed the same functional assays. We used RNA-sequencing to identify the mRNAs whose levels are altered when NSUN2 is knocked down, and some of the targets identified were validated by analyzing protein and RNA levels using Western blotting and RT-PCR, respectively. Results Knocking down NSUN2 in EOC cells decreased colony formation and cell growth by compared to control. Knocking out NSUN2 also caused a decrease in cell growth, but it is less pronounced compared to the NSUN2 knockdown model. Due to the role of NSUN2 in cell growth, we used Western blotting to analyze certain proteins involved in the cell cycle and apoptosis. We found that knocking down NSUN2 caused the levels of the cell cycle inhibitor p27 to increase, and the anti-apoptotic factor Bcl-xl to decrease. This suggests that NSUN2 knockdown leads to both decreased cell cycle progression and increased apoptosis, which is consistent with the pro-tumorigenic effects of NSUN2. To further investigate the molecular mechanisms of NSUN2 on cell behaviour, we performed RNA-sequencing in NSUN2 knockdown and control cells. The RNA-seq analysis identified 664 downregulated and 366 upregulated genes. By validating some of these targets, we found that knockdown of NSUN2 caused increased levels of the proteins PPIF and FRA-1 compared to control in the early passages. However, the levels of PPIF and FRA-1 became similar in the NSUN2 knockdown cells compared to control in the late passages. This suggests EOC cells may be able to adapt to the loss of NSUN2 over time. Conclusion Our study highlights NSUN2's significant role in promoting EOC cell tumorigenicity. Reduced NSUN2 levels impairs cell growth and colony formation and causes dynamic gene expression changes over time as demonstrated by RNA-sequencing and Western blotting of multiple proteins. The potential for EOC cells to adapt to the loss of NSUN2 over time requires further study. Our findings support NSUN2 as a potential therapeutic target for EOC, warranting further investigation into its molecular pathways and therapeutic implications.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 124
Presenter: Jiaqing Wang
Supervisor: Le, Lawrence H
Title: A study of accuracy and reliability of intraoral ultrasound using ex-vivo and in-vivo data
Authors: Jiaqing Wang, Lucas Graf-Alexiou, Kim-Cuong T. Nguyen, Trang H. Hoang, Maria Alexiou, Thanh-Giang La, Neelambar R. Kaipatur, Kumaradevan Punithakumar, Paul W. Major, Edmond H.M. Lou, Lawrence H. Le

Theme: Children's health and well-being

Introduction: Intraoral ultrasonography (iUS), an emerging imaging modality, has shown significant potential to be a diagnostic tool in dentistry. iUS can demonstrate high-resolution imaging of periodontium in animal and human studies. Since iUS does not expose the patient to ionizing radiation, imaging can be performed routinely on children and can be repeated at regular intervals, such as monitoring periodontal disease progression, and orthodontics treatment. Despite the advantages of real-time and ionizing radiation-free imaging, iUS is still in the process of being adopted for dental diagnosis. In this work, we evaluated iUS-derived periodontal parameters for accuracy and reliability for ex-vivo and in-vivo data. Methods: Measurements from human cadavers and orthodontic adolescent patients were used to evaluate the accuracy and reliability of high-frequency (20 MHz) iUS. Firstly, measurement accuracy was assessed on iUS and micro-computed tomography (µCT) images for the maxillary and mandibular teeth of the cadavers, which were obtained with ethical consents via donation by the Department of Anatomy at the University of Alberta. We selected pairs of iUS and corresponding µCT images for measurements based on at least one set of vertically aligned pre-drilled grooves on the tooth. Two trained raters measured the alveolar bone level (ABL) between the cementum-enamel junction (CEJ) and the alveolar bone crest (ABC), and the thickness of alveolar crestal bone (ABT) on both iUS and µCT images, following a two-week calibration exercise. The accuracy was evaluated using t-tests, and Bland-Altman (BA) plots. Secondly, reliability evaluation was conducted on clinical iUS images of adolescent orthodontic patients. Three raters performed measurements of four parameters twice on the clinical iUS images: ABL, ABT, the gingiva thickness close to the ABC (GT1), and the gingiva thickness at 2 mm away from the gingival margin (GT2). The intra- and inter-rater reliabilities were evaluated using the intraclass correlation coefficient (ICC). Results: For accuracy evaluation, 50 pairs of iUS and corresponding µCT were obtained from two female and one male cadavers (aged 62, 70, and 75 years respectively); and the results showed low bias in the BA analysis, and the t-tests had p-values > 0.2. For reliability study, the samples included 134 teeth (31 central, 35 posterior incisors, 33 canines, and 35 premolars) from 19 adolescent (mean age 13.8 ± 1.8 years, 13 females) patient under orthodontic treatment, and the results on adolescents' study demonstrated excellent ICC scores (> 0.9) for ABL, GC1, and GC2, and good scores (> 0.8) for ABT measurements in both inter- and intra-rater analyses on iUS. Conclusion: The accuracy analysis on the cadavers showed no statistically significant difference in measurements between iUS and µCT. The reliability analysis on clinical data demonstrated high intra- and inter-rater reliabilities for the periodontal measurements.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 126
Presenter: Francis Leier
Supervisor: West, Lori
Title: A novel LuminexTM assay allows exploration of age- and sex-related differences in ABO antibody development
Authors: Francis Leier, Anne Halpin, Caishun Li, Jean Pearcey, Esme Dijke, Simon Urschel, Bruce Motyka, Lori West

Theme: Children's health and well-being

Introduction: Infants awaiting heart transplantation (Tx) face high risk of mortality due to limited donor availability; this can be alleviated through use of ABO-incompatible (ABOi) donor organs during early life when natural ABO antibodies are low. Hemagglutination assays are the only clinical method to measure ABO antibodies but have known limitations with reproducibility and specificity. More precise quantification of ABO antibodies would facilitate greater accuracy in risk assessment for ABOi Tx candidates. We created an ABO LuminexTM single-antigen bead-based assay with the ability to detect and characterize ABO antibodies specific for all 6 individual A, B, and H (O) subtype glycans (I - VI) and differentiate IgG and IgM isotypes. Data are limited regarding the development of ABO antibodies in early life and through adolescence. We hypothesized that accurate and detailed measurement of the evolution of ABO antibody production will allow improved risk assessment for ABOi Tx. Here we describe assessment of ABO antibodies using this assay in a pediatric cohort. Methods: Using the LuminexTM assay, ABO antibody subtype-specificity and isotype were measured in plasma samples from ABO-O and ABO-A pediatric patients (age 2 days-16.6 years). Samples were from non-Tx heart surgery patients (without previous Norwood procedure): ABO-O: n=68 (n=29/39, female/male); ABO-A: n=63 (n=27/36, female/male), and were divided into three groups based on age in years: 0-2, 2-10, 10-18. IgG and IgM anti-A and anti-B subtype antibodies were reported as mean fluorescence intensity. Analysis focused on specificities to subtypes expressed in tissues (A-II, III, IV and B-II). Statistical analysis was performed using Mann-Whitney and Kruskal-Wallis tests. Results: ABO antibody levels were generally higher with increasing age. In ABO-O individuals, IgM anti-A (II,III,IV) and anti-B (II) levels were significantly higher than IgG for both younger age groups, whereas IgG levels surpassed IgM in the 10-18 year cohort. ABO-A individuals had very low levels of IgG anti-B in all age groups and significantly higher levels of IgM anti-B in the 2-10 year and 10-18-year age groups compared to the younger cohort. Female ABO-O individuals had significantly higher IgM anti-A antibodies compared to males in the 10-18-year-old group ($p=0.035$); although not significant ($p=0.37$), there was also a trend toward increased IgG anti-A in age 10-18 females as compared to males. Sex-related differences were not analyzed for ABO-A individuals due to low numbers. Conclusions: These results using our novel ABO LuminexTM bead-based assay provide new insight into the development of ABO antibody production in children. The age-related change in predominance of IgM to IgG isotype anti-A antibodies in pediatric ABO-O individuals has not been previously reported for ABO antibodies, but suggests a progressive switch from "T-independent" to T-mediated immune response with maturation. Observed sex-based differences in this patient population will require further investigation. A comprehensive and precise understanding of ABO antibodies will help determine eligibility for safe ABOi Tx and allow better immune risk assessment, especially when considering patients for transplant beyond early childhood.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 127
Presenter: Jenna Mayowski
Supervisor: Kelly, Erin
Title: Outcomes of the static vs dynamic autologous fascial pubovaginal sling for stress urinary incontinence
Authors: Jenna Mayowski, Erin Kelly MD, Mom Hyakutake MD, Allison Edwards MD

Theme: Lifelong women's health

Introduction: Stress urinary incontinence (SUI) is the involuntary loss of urine upon physical exertion, such as exercising, sneezing, laughing, or coughing. It is an extremely common condition, affecting over one third of adult women in their lifetime. It can negatively impact quality of life in various aspects, including in financial, social, and emotional ways. Although many conservative treatments are available for SUI, surgical procedures are one of the most effective therapies. One surgical option is the autologous fascial sling (AFS). In this procedure, a strip of the patient's abdominal rectus fascia is harvested and then fashioned into a 'hammock' underneath the urethra to provide compressive support against leakage. The sling must pass from under the urethra and into the abdomen where the sling arms are secured. The static and dynamic AFS techniques vary in how the sling arms are secured. In the static AFS, the arms are secured to Cooper's ligament near the bladder. In the dynamic AFS, they are secured to the rectus fascia from which the sling material was procured. A common dysfunction of the AFS is urinary retention, or postoperative voiding dysfunction (POVD). This is when the patient cannot void or cannot empty their bladder completely after surgery, which can have detrimental effects on bladder health. The objective of this study is to determine if there is a significant difference in POVD and SUI cure rates in patients who undergo the static AFS versus patients who undergo the dynamic AFS. Methods: We reviewed the charts of 310 patients who underwent the static or dynamic AFS procedure from January 1 2018 to December 31 2022. Patient characteristics, operative characteristics, and postoperative characteristics and outcomes were collected out to one year post sling surgery. Results: Overall, 88.3% (n =273) of patients in this cohort underwent the static AFS, while 11.7% (n =36) underwent the dynamic AFS. Concerning POVD, 10.7% (n =26)of patients who received the static AFS were discharged from the hospital with a bladder catheter, while 34.4% (n =11) of dynamic AFS patients required an indwelling catheter at discharge. At six months post-op, 62.7% (n =99) of static AFS patients reported subjective cure, while 1.8% (n =5) still required catheterization. For dynamic AFS patients, 75% reported cure while 5.6% (n =2) required ongoing intermittent catheterization six months after surgery. Conclusion: In our cohort, the static AFS was more frequently performed, and was associated with lower acute and chronic rates of POVD.

This research has been funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 128
Presenter: Alyssa Wiedemeyer
Supervisor: Bourque, Stephane
Title: Perinatal Iron Deficiency Alters Macrophage Phenotypes in Offspring Kidneys .
Authors: Alyssa Wiedemeyer, Brandon Truong, Si Ning Liu, Jad-Julian Rachid, Ronan Noble, Claudia Holody, Sameera Zia, Jason Plemel, Stephane Bourque.

Theme: Pregnancy and developmental trajectories

Introduction: Macrophages play critical roles in the developing kidney and can be classified as growth promoting M2 or inflammatory M1 macrophages. These cells may switch phenotypes in response to microenvironmental cues such as cytokines released from growing or damaged cells and nutrient and energy substrate availability. Iron deficiency (ID) affects roughly 39% of pregnancies worldwide and negatively impacts offspring growth. One organ that appears to be particularly sensitive to developmental perturbations is the kidney; ID has been shown to impair nephrogenesis, and result in long-term renal dysfunction. However, the underlying cellular mechanisms that drive these developmental alterations unknown. We hypothesized that perinatal ID influences macrophage polarization towards an inflammatory phenotype, thereby impacting kidney development. Methods: Female Sprague-Dawley rats were fed an iron-restricted (3-10mg/kg) or iron-replete (37mg/kg) diet prior to and throughout gestation. Dams were euthanized one day before birth - on gestational day 21 - and fetal tissues were collected and blood hemoglobin (Hb) concentrations were measured. Immune cells from male and female kidneys were enriched via fluorescence activated cell sorting, then live CD45+ cells were processed for single cell RNA sequencing (scRNAseq). Resulting libraries were processed and analyzed using the Seurat workflow in the R statistical environment. Results: Hb was reduced by 55% in males and 59% in females (both $P<0.001$) and fetal weights were reduced by 24% in males and 20% in females (both $P<0.001$) in ID offspring. Unbiased scRNAseq clustering revealed 14 distinct macrophage populations. We identified four tissue resident, three monocyte-macrophage, four intermediate, one stem cell derived, and two ID associated populations of cells. Interestingly, one M2-like resident population was highly increased in ID offspring (102% in females and 52% in males) which had high expression of the inflammatory gene Nos2 which encodes for iNOS, a commonly used M1 macrophage marker. We further observed decreases in the three Nos2¬¬ negative M2-like populations (-68%, -54%, -82% in males; -54%, 14%, 78% in females) and increases in M1-like populations (32%, 70% in males, 43% in females). Differentially expressed gene analysis revealed distinct ID expression patterns. Functional profiling revealed ID offspring of both sexes had upregulation of Hif-1 and glycolysis/gluconeogenesis (all $P < 0.001$) signaling consistent with M1 polarization. Downregulation of numerous functional pathways, including chemokine and enzyme binding (both $P<0.01$) were altered in ID offspring. Conclusions: These results support the hypothesis that perinatal ID impacts macrophage phenotypes within the kidney, resulting in decreased growth promoting M2-like cells concomitant with increased inflammatory M1-like cells, and altered gene expression of macrophage functions. Correcting this polarization presents a potential strategy to mitigate the effects of perinatal ID on offspring kidney development.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 129
Presenter: Melissa Allen
Supervisor: Pituskin, Edith
Title: Does one size fit all? Exploring best-evidence on pessary device fit and effectiveness: an integrative review
Authors: Melissa Allen, RN Student NP Edith Pituskin, RN MN (NP) PHD Kathleen Hunter PhD RN NP GNC(C) NCA

Theme: Lifelong women's health

Introduction & Background: Pelvic organs prolapse [POP] is a condition in which the pelvic organs descend from their normal anatomical positioning and bulge into the vagina. It is prevalent in approximately 50% of women and is associated with risk factors including childbirth, obesity, pelvic surgery, or conditions that increase intra-abdominal pressure. Symptoms include urinary and fecal incontinence, urinary retention, vaginal fullness, and constipation. POP can also affect mental health, sexual health, and quality of life for women living with the condition. Treatment for POP can include lifestyle modifications, medical management, and surgical interventions. For many, medical management using a pessary device is necessary especially in women of child-bearing years or those who wish to avoid surgery. A pessary is a prosthetic device that is inserted into the vagina to support the internal structures. An appropriate fit is essential to reduce symptoms related to POP, prevent complications such as pain or internal abrasions, and promote patient adherence. Currently, there is a lack of consensus among research and guidelines how women with pelvic organ prolapse are sized for appropriate pessary device use in practice. Our goal is to explore and summarize evidence on pessary device fit and effectiveness for women with pelvic organ prolapse. Methods An integrative review methodology is being utilized to guide this review. Search strategy involves databases MEDLINE, CINAHL, and Scopus. Search terms include: pelvic organ prolapse, pessary, pessaries, and fit. Inclusion criteria: female sex, diagnosis of POP, use of pessary device, and research from developed countries. Research articles are peer-reviewed, written in the English language, and published within the last fifteen years to be considered current. Two reviewers will independently evaluate titles and abstracts. Articles selected will undergo review of full text for relevancy followed by quality appraisal and screening. Data evaluation and analysis to follow. Anticipated results We expect this project to identify methods/techniques of best practice, personalized treatment considerations, and potentially further exploration of customized pessary devices. Preliminary results from this study will be presented during WCHRI research day. Conclusions The results of this review are expected to assist health care professionals with optimal pessary device fit for women living with pelvic organ prolapse. A summarization of current evidence and strategies applicable for clinical practice may enhance patient comfort, improve compliance, and prevent associated complications. The research may also be applicable to policies aimed at improving women's health including optimization of patient experience and outcomes. Keywords: pessary, fit, pelvic organ prolapse.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 151
Presenter: Murilo Graton
Supervisor: Davidge, Sandra
Title: Effects of prenatal hypoxia on the biomechanical properties of carotid arteries in the adult offspring
Authors: Murilo E. Graton, Amanda A. de Oliveira, Floor Spaans, Raven Kirschenman, Sandra T. Davidge

Theme: Pregnancy and developmental trajectories

Introduction: Prenatal hypoxia, a common pregnancy complication, is associated to increased risk of cardiovascular disease, such as stroke, of the offspring later in life. However, the mechanisms are not known. Carotid arteries are responsible for providing oxygen and nutrients to the head. Blood flow regulation in the carotid arteries partly occurs via an intrinsic tendency of blood vessels to contract in response to increased blood pressure, a mechanism also known as myogenic tone. Moreover, based on vessel structure, other biomechanical properties of the carotid arteries, such as circumferential stress and strain, are also involved in this process. However, the potential impact of exposure to prenatal hypoxia on the biomechanical properties of carotid arteries has not been assessed. We hypothesize that prenatal hypoxia impairs the biomechanical properties leading to a loss of myogenic tone in carotid arteries from the adult offspring. Methods: Pregnant Sprague-Dawley rats were exposed to normoxia (21% O2; Normoxia) or hypoxia (11% O2; Hypoxia) from gestational day (GD) 15 to 21 (term=22 days). Male and female offspring were used at 4 months. Biomechanical properties of isolated left external carotid arteries (200-300 µm) were assessed by pressure myography. Changes in the inner, outer diameter and wall thickness were recorded. Arteries were exposed to steps of increasing pressure (4-160 mmHg) in buffer containing calcium to assess active mechanical properties, and in calcium-free EGTA buffer to prevent myogenic tone and assess passive mechanical properties. Myogenic tone was calculated from the two pressure curves as percentage of the difference between the inner diameters. Circumferential stress (thinning of the vessel wall due to pressure) and strain (change in vessel diameter due to pressure) were calculated as a measure of compliance of the vessels. Data were analyzed by Student's t-test; $p<0.05$ was considered significant; n=9-10/group. Results: In carotid arteries from male adult offspring, circumferential strain, but not stress, was increased by prenatal hypoxia compared to carotid arteries from male normoxia offspring ($p=0.0315$). In addition, in carotid arteries from male adult offspring, prenatal hypoxia reduced the myogenic tone when compared to normoxia-exposed offspring ($p=0.0152$). In carotid arteries of the adult female offspring, no differences in circumferential stress and/or strain, or myogenic tone, were observed after prenatal hypoxia exposure. Conclusions: Prenatal hypoxia increased arterial stiffness (circumferential strain) in carotid arteries from male adult offspring. This may represent early manifestations of adverse structural and functional changes within the vessel wall and may be an important independent predictor of future adverse cardiovascular events. Prenatal hypoxia also led to the loss of myogenic tone which in male adult offspring, which may have severe impact on the blood flow regulation to the head. Surprisingly, carotid arteries of the adult female offspring were not affected by hypoxia exposure in utero. These results expand our knowledge on the sex-specific differences of how complicated pregnancies can program cardiovascular disease in the offspring in adult life.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 155
Presenter: Brandon Truong
Supervisor: Bourque, Stephane
Title: Perinatal iron deficiency alters dendritic cell, neutrophil, and mast cell populations in the fetal kidney
Authors: Brandon Truong, Alyssa Wiedemeyer, Claudia Holody, Jad-Julian Rachid, Ronan Noble, Si Ning Liu, Sameera Zia, Jason Plemel, Stephane Bourque

Theme: Pregnancy and developmental trajectories

Introduction: Perinatal iron deficiency (ID) impairs fetal kidney growth trajectories, but cellular mechanisms of altered development are not well described. Myeloid cells-including dendritic cells (DCs), mast cell and neutrophil granulocytes-form a network of interactions which are implicated in normal and pathologic kidney function. The phenotypes of these cells may be influenced by environmental stimuli including nutrient deficiency. Therefore, this project aimed to characterize the effect of perinatal ID on the phenotypes of DCs, neutrophils, and mast cells in affected offspring using single-cell RNA sequencing (scRNA seq). Methods: Female rats were fed an iron-deplete (3-10 mg/kg elemental iron) or iron-replete (37 mg/kg elemental iron) diet throughout pregnancy to induce ID. Male and female fetal kidneys were collected on gestational day 21 (one day before birth). CD45+ immune cells were isolated from fetal kidney samples using fluorescent activated cell-sorting and analyzed by scRNA seq via the Seurat workflow in the R statistical environment. DCs, neutrophils, and mast cells were first identified by characteristic genetic markers, and clustered for analysis. Differential gene expression analysis was used to characterize the populations of each cell type comparing offspring exposed and not exposed to perinatal ID. Results: ID female fetuses had a 59% reduction in Hb and in males a 55% reduction (both $p<0.001$). ID reduced fetal female and male body weights by 20% and 24%, respectively (both $p<0.001$). scRNA seq revealed six DC, six neutrophil, and four mast cell populations. DCs were identified by high Irf8 and Flt3 expression, neutrophils by high Lrg1 and Mmp9 expression, and mast cells by high Cma1 and Enpp3 expression. Analysis of differentially expressed genes of each population revealed ID-associated DC and neutrophil clusters that were enriched with proteins related to cellular stress. These clusters expressed high amounts of heat shock proteins and were either entirely ID-associated or strongly upregulated by ID (+2000% in a DC cluster in females). Clusters downregulated by ID included immature neutrophils with high Ngp, Lcn2, and Camp expression (-52.9% in females and -46.5% in males). Interestingly, the proportion of two proinflammatory, phagocytic DC clusters and one proinflammatory neutrophil cluster with high Il1b and chemokine expression remained mostly unchanged by ID, suggesting that shifts in the inflammatory profiles of other myeloid cells such as macrophages may have a larger effect in impairing kidney growth. Sex-dependent effects were seen in DC and neutrophil populations enriched in ribosome proteins components. Mast cell gene expression profiles could not be analyzed due to low cell counts. Conclusion: In this study, DC, neutrophil, and mast cell populations in ID kidneys were characterized, allowing a better understanding of their functions in impairing kidney development in this disorder. Characterizing myeloid cell phenotypes and their interactions in gestational ID at a single-cell resolution provides insight into the complex mechanisms underlying kidney growth impairment, which may be targets for treating this common nutritional disorder.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 157
Presenter: Cristian Neves
Supervisor: Ladha, Tehseen
Title: Shaping the care they deserve: Needs, expectations, and recommendations of healthcare provision at the New Canadians Health Centre for Afghan Refugee Women in Edmonton.
Authors: Cristian Neves.

Theme: Lifelong women's health

Background: Healthcare plays a crucial role in shaping the journey of refugee resettlement and contributing to their overall well-being (Mkanta et al., 2017; Zivot et al., 2020). Emerging from a society characterized by male-centric norms that have curtailed their rights and perpetuated a pattern of systematic and violent actions against them, Afghan refugee women find themselves in a vulnerable position (Hossain & Dawson, 2022). Consequently, healthcare systems within host countries must earnestly acknowledge and address these susceptibilities while at the same time promoting women's agency to be a significant partner in their own care. While significant research has been conducted on refugees' health status and risk factors, limited attention has been given to understanding their preferences and perspectives regarding culturally appropriate and psychologically safe healthcare services (Shen, 2015). This complexity arises from the fact that patients' preferences are influenced by their cultural background, personal values, and prior experiences with healthcare, making a one-size-fits-all approach ineffective. Therefore, the purpose of this research is to understand the needs and expectations of healthcare for Afghan refugee women from their point of view and promote their recommendations for tailored healthcare provision at the New Canadians Health Centre (NCHC) in Edmonton, Alberta. Methods: This community-engaged research uses interpretative phenomenological analysis approach to answer the following guiding questions: 1. What are the healthcare needs and expectations for Afghan refugee women? 2. What are the lived experiences of Afghan refugee women accessing the NCHC? 3. What practices would support the NCHC in addressing the health needs of Afghan refugee women? An advisory committee is being engaged throughout all phases of this study to provide feedback and advice on research procedures and instruments pertaining to cultural appropriateness and psychological safety. The advisory committee is composed of one Afghan refugee woman community leader, an NCHC research and evaluation committee member, and one NCHC staff member. Stakeholder engagement and the co-development of a culturally appropriate and psychologically safe research environment have been crucial for accessing the NCHC. The results are expected to contribute to tailored and safe practices when providing healthcare services to Afghan refugee women. These results are expected to benefit other refugee agencies as well.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 159
Presenter: Alaa Fouli
Supervisor: Salma, Jordana
Title: Walking safely in the face of Islamophobia: Tales of Edmonton's older immigrant Muslim women
Authors: Alaa Fouli, Jordana Salma

Theme: Lifelong women's health

Introduction Islamophobia negatively affects Muslims mentally, emotionally, and physically, and can lead individuals to perceive that they are unsafe. Existing literature on Islamophobia focuses on the experiences of young Muslims; there is inadequate research exploring the experiences of Muslim older adults. Muslim women are at higher risk than men for experiencing Islamophobia, as their religious attire (the hijab) makes them visibly Muslim. This research project was carried out to learn about how Islamophobia shapes the experiences of older immigrant Muslim women as they walk in their neighbourhoods. Methods This research project drew on qualitative methods and data was collected through sitting and walk-along interviews. Two-hour recorded sitting interviews were carried out in participants' homes and in their preferred language (Arabic). Walk-along interviews were conducted in neighbourhood areas where participants typically walked. The study setting included all neighbourhoods within the city of Edmonton, Alberta, Canada. To meet the eligibility criteria, participants had to be Muslim, women, immigrants, aged 50+, and not have any health conditions where walking outdoors would be contraindicated. Primary outcomes of the study were to explore the unique perceptions and experiences of safety of older Muslim women in relation to Islamophobia as they walked in their neighbourhoods. Interview guides, sociodemographic forms, and reflexive memos were used to capture the data. Interview recordings were later transcribed and analyzed to identify prominent themes within the data. Results Six individual sitting interviews and one focus group interview composed of four individuals were conducted, as well as seven walk-along interviews. Out of ten participants, five reported that hearing about Islamophobic incidents or attacks triggered a sense of fear for their own safety. Two participants out of ten stated that Islamophobic incidents outside of Edmonton negatively affected their sense of safety. All participants discussed avoiding walking after sundown as a strategy to stay safe. Two participants described feeling less motivated to go out walking in their neighbourhood after hearing about Islamophobic attacks, and one participant mentioned avoiding taking the Light Rail Transit (LRT) at all costs because she considers it unsafe. A few participants disclosed that they felt safe walking outside, as long as Islamophobic incidents did not occur in their neighbourhoods. Positive coping mechanisms identified among participants included taking measures to increase feelings of safety, such as by walking in groups, as well as drawing strength from the belief that God is the ultimate protector. Conclusion Islamophobia impacts the perceptions of safety of older Muslim women in variable ways, regardless if experiences of Islamophobia are experienced firsthand or experienced vicariously. Understanding older Muslim women's perceptions and experiences of Islamophobia can facilitate the development of resources and supports to alleviate the challenges faced by this community and promote overall health and well-being. KEYWORDS: Islamophobia, Muslim women, older adults, safety

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 161
Presenter: Joshua Avery
Supervisor: Top, Deniz
Title: Transcriptional and Neuronal Activity in Different Regions of the Brain Influences Distinct Behavioural Outputs
Authors: Joshua Avery

Theme: Children's health and well-being

Introduction: The molecular mechanisms that govern behaviour are not well understood. Part of the reason is that learned behaviour and innate behaviour can be difficult to distinguish, since variation in experience can lead to differences in behaviour. Therefore, study of innate behaviour can lead to a clearer understanding of the molecular mechanisms that govern behaviour. Circadian behaviour is a good model for innate behaviour, which can be exploited to understand its molecular and genetic regulatory mechanisms. Circadian behaviour is the collective term used to describe rhythmic behavioural responses of an organism to daily planetary rhythms (e.g., sleep-wake cycles). This innate behaviour is regulated by a transcription negative feedback loop called the circadian clock, which is evolutionarily conserved across almost all animals and plants, and some fungi and bacteria. In Drosophila, the clock is found in 75 neurons organized into 9 clusters in each hemisphere of the brain. Using this model organism, we show that the neurons within this network and the clocks within the neurons regulate different aspects of circadian behaviour. This suggests that this circadian neuronal network is organized into a flexible system that responds to different inputs and generates different outputs. We hypothesize that disruption of either a clock or a neuron within the network would have distinct effects on a developing brain and lead to behavioural disorders. Methods: The Gal4/UAS system commonly used in flies allows anatomically and temporally restricted expression of genes. Interfering RNA (RNAi) can be similarly expressed using this system to reduce the expression of target genes. We employ these tools to systematically eliminate clocks and neuronal function in parts of the circadian neuronal network to determine their role in different aspects of circadian behaviour, such as locomotion, sleep and feeding behaviour. Results: Our data suggest that different clocks and neuronal activity contribute to different aspects of circadian behavior. Clock and neuronal activity of the so-called s-LNv neuronal cluster group is important for morning anticipation (waking behaviour), as determined previously. Strikingly, clock activity in the eye is also important for morning anticipation, suggesting that light input from the eye to inform the central clocks are evolutionarily conserved. Equally surprisingly, a loss of clock activity in the so-called LNds, which regulate evening anticipation (ready-for-bed behaviour), also alters morning anticipation. Overall, our data suggest distinct and overlapping functions for clocks and neurons to regulate aspects of circadian behaviour. Conclusion: Different clocks and neurons contribute differently to aspects of circadian behaviour. Thus, loss of activity in some clocks and neurons will influence behaviour differently, depending on which areas of the brain are affected. Our data may explain how patients with emerging neuropsychiatric and behavioural disorders result in differently affected sleep patterns and other behavioural changes; different regions of the circadian neuronal network will alter behaviour predictably.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 164
Presenter: Eden Markovski
Supervisor: Top, Deniz
Title: Pathways of molecular clock communication across the Drosophila melanogaster brain
Authors: Markovski E., Schofield M., & Top, D

Theme: Children's health and well-being

Introduction: Behaviour is regulated through a network of neurons and transcription programs in the brain. Circadian behaviour is an innate behaviour that lends itself to robust and reproducible measurement, making it an ideal model for understanding the mechanisms that regulate behaviour. Circadian clocks are evolutionarily conserved transcription feedback loops that regulate circadian behaviour and circadian physiology. However, how circadian clocks communicate with each other to regulate circadian behaviour is not fully explored, primarily due to a lack of suitable tools. We developed a method called LABL (Johnstone et al., 2022) to measure circadian clock oscillations in distinct neurons, in vivo, using Drosophila melanogaster as a model organism. This method bypasses the need to measure locomotion behaviour, which is the terminal output of the circadian clocks, and allows us instead to measure circadian clocks directly to determine how circadian clocks can communicate with each other. Here, we genetically modify the Drosophila eye to determine which circadian clocks in the brain circadian neuronal network are responsive to the eye clock. Our data suggest that preferred communication pathways exist across this singular network, contradicting previous assumptions. Methods: The Drosophila Gal4/UAS and the LexA/LexAop systems allow for anatomically and temporally restricted expression of different genes. We exploited these tools to eliminate the Drosophila eye clock and silenced various neurons while simultaneously using LABL to monitor different brain clocks. We compared changes in transcriptional oscillations to changes in Drosophila behaviour. Results: Our data suggests the eye clocks communicate with the so-called LNd neuronal cluster of the circadian neuronal network to regulate waking behaviour in flies, while leaving other clocks unaffected. Our preliminary data suggest that this regulation is mediated through the LNvs. We propose a new model of circadian behaviour regulation that includes a flexible network of preferred communication pathways that are employed as a function of environmental input. Conclusion: Our data suggest that the circadian neuronal network is not a homogeneous network of clocks and neurons, as previously assumed. We favour a new model in which information passed through the neuronal network is context dependent and can be differently altered with genetic mutation. Our data also show that mutation-caused disruption to transcriptional programs in one part of a neuronal network can have different effects in transcription programs in other parts of the brain. This suggests that a mutation in one part of the brain can reveal its deleterious effect in a different part of the brain. Our data highlight the complexity of understanding behaviour genes in the context of behavioural disorders in the developing brain. Our continued work will provide insight into how disrupted behaviour genes are linked to behavioural disorders in children, at the molecular level.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 167
Presenter: Kara Goodkey
Supervisor: Voronova, Anastassia
Title: Olfactory bulb anomalies in KBG syndrome mouse model and patients
Authors: Kara Goodkey, Anita Wischmeijer, Laurence Perrin, Duccio Maria Cordelli, Francesco Toni, Maria Gnazzo, Francesco Benedicenti, Monique Elmaleh-Bergès, Karen J. Low, Anastassia Voronova

Theme: Children's health and well-being

INTRODUCTION: ANKRD11 (Ankyrin Repeat Domain 11) is a chromatin regulator and the only gene associated with KBG syndrome, a rare neurodevelopmental disorder that is named after the first three families diagnosed. KBG syndrome patients display aberrant brain development, global developmental delay, autism, and intellectual disability. The brain is built by neural stem cells, which must generate neurons and glia (non-neuronal cells oligodendrocytes and astrocytes) in a strict spatio-temporal manner. The olfactory bulb (OB) is part of the brain that is responsible for olfaction (sense of smell). Reduction or loss of olfaction is linked to behavioural changes in patients with mental or neurodevelopmental disorders, like schizophrenia. Here, we show a novel olfactory bulb phenotype in a KBG syndrome mouse model and two diagnosed KBG syndrome patients. METHODS: We used a mouse model where Ankrd11 is inducibly knocked out in neural stem cells using a Cre/Lox system. Ankrd11 knockout was induced with tamoxifen injection at embryonic day (E) 14, a time point prior to the complete formation of the OB. OB formation was then analyzed during embryonic, and postnatal development. OB phenotypes in KBG syndrome patients were recorded via magnetic resonance imaging (MRI) and/or clinical observations. RESULTS: Conditional knockout of Ankrd11 in murine embryonic neural stem cells resulted in aberrant postnatal olfactory bulb development and reduced size. We further showed relatively normal formation of olfactory bulb outer neuronal layers with a reduced density of progenitors, neuroblasts, and neurons in the olfactory bulb core. Finally, we demonstrated incomplete migration of neuroblasts along the postnatal rostral migratory stream, which results in a decreased cell density in the olfactory bulb core. We also described two clinically and molecularly confirmed KBG syndrome patients with anosmia (lack of smell) and OB structure perturbations, such as and hypo-dysgenesis/agenesis (reduction or lack of OB structures). CONCLUSIONS: Our work contributes significantly to the OB development and neurodevelopmental disorders fields and has important translational implications. First, our report establishes a strong causative link between ANKRD11 perturbations and OB deficiencies in mice and humans. From a basic science and mechanistic perspective, our results indicate a critical role of Ankrd11 in neural stem cell migration. From a clinical perspective, our work suggests OB size or olfaction evaluations should be considered upon KBG syndrome diagnosis for appropriate genetic counselling and to improve clinical care.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 168
Presenter: Sarjana Alam
Supervisor: Dijke, Esme
Title: Exploiting ice recrystallization inhibitors as a novel cryoprotectant agent for cryopreservation of regulatory T cells for immunosuppressive cell therapy
Authors: Sarjana Alam, Rebecca Mercier, Lavinia Ionescu, Lori West, Jason P. Acker, Esme Dijke

Theme: Children's health and well-being

INTRODUCTION Regulatory T cells (Tregs) are natural suppressors of the immune system, and play a key role in tolerance induction. Tregs' immunosuppressive properties make them a subject of interest for tolerogenic cell therapy to suppress graft-directed immune responses in organ transplantation. Pediatric transplant recipients would greatly benefit from such a therapy since the heavy immunosuppressive burden of current lifelong therapies are associated with morbidities and adverse side-effects. Successful implementation of Treg tolerogenic cell therapy in the clinical setting requires that cryopreservation and recovery processes maintain high Treg viability and function. However, standard practices currently in use are not optimized for Tregs. The conventional cryoprotectant agent (CPA) dimethyl sulfoxide (DMSO) is cytotoxic, contributing to low recovery and reduced Treg function post-thaw. Novel CPAs, such as ice recrystallization inhibitors (IRI), may offer lower toxicity and greater cryoprotection. Here, we investigated the toxicity of IRI to Tregs. METHODS Peripheral blood mononuclear cells (PBMC) were isolated from the whole blood of healthy volunteers (n=2) using density gradient centrifugation. Tregs were isolated from the PBMC by a magnetic bead-based isolation protocol and expanded in an optimized 10 day Treg expansion protocol. Treg phenotype was assessed by flow cytometric analysis. Expanded cells were suspended in 10% DMSO (standard protocol), 5% DMSO, or 5% DMSO with N-(2-fluorophenyl)-d-gluconamide (2FA) IRI, and stored at various temperatures (4, 22, 37 oC) for 0, 2 and 4 hours. Treg recovery and viability were assessed by an automated cell counter. RESULTS Phenotype assessment demonstrated that 77-80% of the viable cells were CD4+CD25+FOXP3+, confirming the Treg phenotype of the isolated cell population. Cells maintained the Treg phenotype during culture, with 80-88% of the cells being CD4+CD25+FOXP3+ on day 10 of expansion. In preliminary analysis, Treg viability and recovery was higher for cells suspended in 5% DMSO compared to cells suspended in 10% DMSO. No clear difference between 5% DMSO alone or 5% DMSO with IRI was observed. CONCLUSION Our preliminary findings suggest that lower DMSO concentration may be less toxic to Tregs. Further tests are being done to assess the viability and recovery of Tregs following cryopreservation. Identifying the CPA best suited for Tregs will facilitate significant progress in the development of an optimized Treg cryopreservation protocol for tolerogenic cellular therapy.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 170
Presenter: Tamara Semeria Maitret
Supervisor: Charlton, Carmen L
Title: The effect of a postnatal MMR booster for low-responder women
Authors: Tamara A. Semeria Maitret, Sabrina Plitt, Troy Baldwin & Carmen Charlton.

Theme: Pregnancy and developmental trajectories

Introduction Rubella is a mild, self-limiting viral infection in infants, but its devastating consequences during pregnancy (e.g., fetal death, miscarriage, stillbirth and birth disabilities/ congenital rubella syndrome [CRS]) make it still relevant from the public health perspective (Winter & Moss, 2022). The introduction of MMR vaccine decreased the incidence of rubella infection and CRS (Lanzieri et al., 2020). However, waning antibodies have been observed in vaccinated individuals (Kontio et al., 2012). This study aims to determine (a) the rubella immune status of low-antibody responder women, and (b) if a booster of MMR vaccine will positively impact the cellular-mediated immune (CMI) response in these women. Consequently, this study may impact Alberta follow-up policy for these low-responder women. Improving the identification of women who lack a protective immune response to rubella, and providing more guidance for Public Health providers. Methods: Cellular-mediated immunity response - validation: Isolated peripheral blood mononuclear cells (PBMCs) were stained with CFSE* at different concentrations, incubated, and measured by fluorescence-activated cell sorting (FACS). CFSE-labelled cells were stimulated with PHA** and CD3/CD28 T-cell activator. On day-3, samples were recovered and stained with anti-CD3+/CD4+/CD8+ antibodies and viability dye and measured by FACS. *Carboxyfluorescein succinimidyl ester; **Phytohaemagglutinin. Cytokine response: PBMCs from healthy volunteers were treated with rubella virus for 3- and 5-days. The supernatant was measured for cytokine response using an EIA assay (Cytokine 10-plex Human panel, Invitrogen-ThermoFisher Scientific, Vienna, Austria). Results CFSE labelling was optimal for this experiment at 1 µM and 5 min of staining. The best positive control for proliferation was CD3/CD28 T-cell activator, promoting the proliferation of CD4+/CD8+ T-cell populations ~ 90% more than PHA. The cytokine response to rubella virus peaked at 3-day indicating a robust response. Also, results corresponded with inflammatory cytokines, such as IL-6 and IL-8. Conclusions Our proof of principle experiments showed rubella cytokine levels were similar to previous studies (Dhiman et al., 2010). CD3/CD28 T-cell activator is the best positive control candidate. With these results, we can test CMI response in MMR-vaccinated women and eventually correlate those data with antibody levels, and avidity, which will give us a more complete understanding of the immune status of low-responder women and the effect of the MMR-booster.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 171
Presenter: Katharine Jensen
Supervisor: Ali, Samina
Title: The impact of health literacy on Canadian pediatric emergency department utilization
Authors: Katharine V. Jensen, MD, MSc, Andrea Morrison, MD, MSc, Maryna Yaskina, PhD, Manasi Rajagopal, MBT, Keon Ma, MD, Patricia Candelaria, BScN, Shannon Scott, MD, Kurt Schreiner, and Samina Ali, MD

Theme: Children's health and well-being

Introduction: Health literacy is defined as a set of skills needed to effectively function in a health care setting. In American pediatric emergency departments (PEDs), the prevalence of low health literacy among caregivers is approximately 50%. Caregivers with lower health literacy are more likely to overestimate severity of illness, overutilize health care resources, and have poor adherence with health-promoting behaviours such as medication compliance and vaccination. Our primary objective was to relate caregiver health literacy to PED utilization with a focus on whether the presentation was considered urgent or non-urgent. The secondary objective was to explore the relationship between social, demographic, and child characteristics as they relate to urgent versus non-urgent PED utilization. Methods: This was a sub-study of a descriptive cross-sectional survey with medical record review. Data were collected from ten Canadian PEDs from October 2018 to March 2020. Study variables included child and caregiver demographics, PED visit details, and the Newest Vital Sign measurement of caregiver health literacy (categorized as low or adequate). PED visits were classified as urgent or non-urgent based on resource utilization in the PED. Logistic regression modeling was used to ascertain effects of specific variables on the urgency of PED utilization. Results: 2005 caregivers participated in the survey. The mean (SD) caregiver age was 37.8 (7.7) years and 74.7% (1457/1950) were female. 74.2% (1462/1969) were mothers, 72.6% (1425/1964) spoke English as a primary language, 51.9% (997/1922) had a university degree, and 45.0% (767/1706) had an income greater than $100,000. The mean (SD) age of the children was 5.9 (5.0) years; 48.1% (963/2003) were female, 32.1% (634/1970) had at least one prior hospitalization, and 81.5% (1603/1966) had previous PED visits. 1957 caregivers participated in the NVS questionnaire. 43.7% (885/1957) of caregivers had low health literacy, while 56.3% (1102/1957) had adequate health literacy. Being a caregiver with a child under 2 years of age [OR 1.83 (1.35, 2.48)] and low health literacy [OR 1.56 (1.18, 2.05)] were associated with increased non-urgent use of the PED. Families with children with chronic medical conditions were less likely to use the PED for non-urgent indications [OR 0.67 (0.46, 0.98)]. Conclusion: Almost half of caregivers presenting to Canadian PEDs have inadequate health literacy, which may limit their ability to understand presented information and make appropriate healthcare decisions for their child. Lower caregiver health literacy is associated with non-urgent PED utilization, potentially indicating difficulty understanding and making decisions about the healthcare concern that brought them to the PED. Interventions to improve population health literacy may have an impact on reducing non-urgent PED utilization and enhancing healthcare outcomes for children.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 172
Presenter: Megan MacNeil
Supervisor: Storey, Kate E
Title: Getting creative about the journey: Engaging youth in conversations about active school travel using a qualitative arts-based approach
Authors: Megan MacNeil, Genevieve Montemurro, Danielle Klassen, Shivani Solanki, Dr. Kate Storey

Theme: Children's health and well-being

Introduction: Youth benefit physically, psychologically, and socially from daily movement. Less time spent doing sedentary activities is associated with improved health and well-being. Establishing regular physical activity in critical development years has positive health behaviour impacts into adulthood. Based on the Canadian 24-hour movement guidelines for youth (aged 5-17 years), school-aged youth should engage in 60 minutes of moderate-to-vigorous physical activity daily. However, only 28% of youth meet the daily physical activity recommendations. Active school travel (AST) is one way to promote habitual physical activity, with benefits for individuals and the environment. The time spent travelling to and from school allows youth to form healthy routines. Youth who walk, cycle, or use other forms of non-motorized travel to and from school have more daily physical activity minutes, improved cardiovascular health and report more significant opportunities for social interactions with their peers. Schools are central community hubs directly impacted by traffic, safety, and health issues. AST also allows youth to engage with public spaces on their school journey, creating a sense of place that fosters social and cultural connectedness. This study aimed to understand youth perspectives on actively travelling to and from school, to help inform school and community-based strategies to support AST in Edmonton, Alberta. Methods: This study utilized focused ethnography to understand the experiences of youth as they travelled actively in their communities to and from school. A draw-and-tell interview approach was used to generate data. This unique approach combines the strength of semi-structured interviews with an arts-based mental mapping technique. This allowed youth to use a creative map-drawing activity to express their perceptions and a participatory approach to enhance researchers' understanding of how youth view their world. This research study recruited 20 school-aged youth between 5-12 years of age living in the city of Edmonton, Alberta. Youth were recruited through city-wide efforts with recruitment posters and messages shared through partner organizations working with youth in Edmonton. Each interview was recorded and transcribed verbatim. Drawings were used to elicit insights from participants through the description and contextualizing of the map elements. Data analysis is ongoing using inductive thematic analysis. Results: Preliminary findings show that youth in Edmonton perceive multiple enablers and barriers (i.e. travelling with friends, pedestrian-friendly infrastructure, secure storage facilities) contributing to their enjoyment, confidence, and feelings of safety when travelling to and from school. Aspects of the built environment and sense of community have meaning and implications for mode choice and independent mobility among school-aged youth. Conclusions: AST promotes daily physical activity and allows youth to engage with public spaces - creating a sense of place that fosters social and cultural connectedness. Findings from this research study will be used to inform implementation research related to active transportation, climate resilience, and modal shift in Edmonton, Alberta through a CIHR Catalyst Grant (2023-24).

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 173
Presenter: Ezra Ketema
Supervisor: Lopaschuk, Gary D.
Title: SIRT2 inhibition decreases glycolysis and attenuates hypertrophic response in H9c2 cells
Authors: Ezra B. Ketema, Muhammad Ahsan, Kaya Persad, Liyan Zhang and Gary D. Lopaschuk

Theme: Children's health and well-being

Introduction: Congenital heart disease (CHD) is the most prevalent birth defect, affecting approximately 2% of all live births globally. Along with other factors, impaired cardiac energy metabolism plays a significant role in heart failure progression in newborns with CHD. However, the molecular mechanisms behind the metabolic alterations seen in children with CHD are not yet fully defined. This ongoing study aims to determine whether changes in the acetylation of glycolysis enzymes and SIRT2 activity contribute to impaired cardiac metabolic maturation and hypertrophic remodelling in newborn hearts with CHD. Methods: Embryonic rat heart-derived H9c2 cells were used for our cell model. Energy metabolic profiles were determined using a specifically designed H9c2 cell perfusion system, and the results were compared between proliferating (immature) and differentiating (matured) H9c2 cells. The metabolic profiles were also assessed in the presence or absence of SIRT2 knockdown by siRNA or pharmacological acetylation modulators. The effects of acetylation modulation or SIRT2 knockdown on hypertrophic signalling was determined by treating cells with phenylephrine. Additionally, ventricular tissue samples will be obtained from infants under six months of age with CHD undergoing corrective surgery. In the tissue samples and cell model, the expression of sirtuins and hypertrophic genes, as well as the acetylation status of the main glycolysis enzymes, will be determined. Preliminary results: Glycolysis rates were significantly reduced in differentiated H9c2 cells compared to proliferating cells. In contrast, glucose oxidation rates increased as the H9c2 cells matured. Treatment with the SIRT2 inhibitor, 10 µM AGK2, significantly reduced glycolysis rates in proliferating H9c2 cells. Also, AGK2 attenuated phenylephrine-mediated hypertrophic responses in H9c2 cells. The final results of this study will contribute to our understanding of post-translational acetylation changes of metabolic enzymes in newborn hearts with CHD and its impact on adverse remodelling and heart failure development. Keywords: Congenital heart disease; cardiac energy metabolism; protein lysine acetylation

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 174
Presenter: Jhanvi Mehta
Supervisor: Hyakutake, Momoe
Title: Efficacy of preoperative patient education programs for elective gynecologic surgery: a systematic review
Authors: Jhanvi Mehta, Liz Dennett, Dr. Erin Kelly, Dr. Momoe Hyakutake

Theme: Lifelong women's health

Introduction: Patients face significant anxiety and stress when preparing for surgery, but research suggests that preoperative education programs can alleviate this unease and improve patient outcomes. This study aims to establish the effects of a preoperative education program for patients preparing to undergo gynecologic surgery. To this end, we designed and conducted a systematic review of the literature pertaining to preoperative patient education for gynecologic surgery to describe and consolidate knowledge of such programs. Methods: Criteria for inclusion in the study were as follows: studies were in English, had adult patients undergoing elective gynecologic surgery, stated all educational interventions that go beyond office counselling by the care team, and were a randomised control trial, cohort study, or clinical trial with pre-and post-test control groups. Case studies, descriptive studies, and qualitative studies were excluded. Results: In total, 945 abstracts were screened; of these, 112 full texts were reviewed. Ultimately, 40 studies were included in the review; their data was extracted, and we examined the content of these programs, modes of delivery, and the outcomes of preoperative patient education programs on patients in these studies (such as satisfaction, pain control, anxiety levels, etc.). Discussion and Conclusion: Although statistical analysis is pending, preliminary results suggest mixed reviews with some interventions having reductions in patient anxiety and improved postoperative pain control, while others had minimal effects compared to the control group. The results from this review will help further understand the impacts of these programs and inform the development of a preoperative patient education program for Urogynecology patients at the Lois Hole Hospital in Edmonton, AB.

This research has been funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 175
Presenter: Brooke Hebert
Supervisor: Nagpal, Taniya
Title: What informs self-efficacy to be active during pregnancy? A presentation of preliminary results
Authors: Brooke J. Hebert, Taniya S. Nagpal

Theme: Pregnancy and developmental trajectories

Introduction It has been shown that physical activity throughout pregnancy has several health benefits for the mom and baby, such as a lower risk of gestational diabetes, preeclampsia and prolonged labour. Despite the well-known benefits, adherence to physical activity throughout pregnancy is low. Self-efficacy is a key factor that is associated with a higher adherence to physical activity throughout pregnancy. The purpose of this study is to determine what informs self-efficacy to be active during pregnancy. These findings may inform future health promotion initiatives to encourage greater adherence to physical activity in pregnancy by highlighting factors that increase self-efficacy. Methods A cross-sectional online survey was promoted via social media. Eligible participants were currently pregnant, ≥18 years of age, and able to communicate in English. Participants filled out the Pregnancy Exercise Self-Efficacy Scale and rank ordered which components of self-efficacy (mastery experience, vicarious experience, verbal persuasion, physiological/affective states) contributed to their decision-making to be active. Additionally, they provided open-ended responses to questions inquiring about their motivators for being physically active. Descriptive statistics and a content analysis on reasons for being active during pregnancy were performed. Preliminary results are currently presented as recruitment is ongoing. Results Presently, 20 participants have completed the survey. Mean age and gestational age are 32.7 years and 24.4 weeks, respectively. 65% of participants will be first time moms and 35% will have their second or third child. Self-efficacy for physical activity was most influenced by physiological/affective states. When asked what the most important reasons to be physically active while pregnant are, 65% of participants said for the health and wellness of the mother, 40% said for the health of the baby and 35% said for less risk of complications in general. When asked about days that they do not exercise, 40% of participants said that they felt like they had a lack of time, 45% said that they were too fatigued and 15% said that it was because they felt too ill. Conclusion Self-efficacy for physical activity during pregnancy may be most influenced by physiological/affective states, such as reduced pain and improved mood. Recruitment of participants is ongoing and future data may confirm these findings, as well as provide opportunity to potentially compare results between pregnant individuals who are meeting or not meeting prenatal physical activity guidelines.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 176
Presenter: Zachary Meyer
Supervisor: Zheng, Yao
Title: Taking Stock and Moving Forward: Synthesizing Ethnic/Racial Diversity in Canadian Social Genomics Research
Authors: Zachary Meyer, Jerry Wu, Dr. Yao Zheng

Theme: Children's health and well-being

Introduction: Social genomics aims to clarify the interplay between social experiences and broader societal and cultural contexts and genetic potentials within people, focusing on socioemotional and behavioral outcomes (e.g., self-esteem, parent-child relationships, substance use). Contemporary literature on human genetics research has predominantly centered on populations of European descent. Canadian social genomics research is no exception, as scant social genomics research has systematically included and represented Canadian marginalized ethnic/racial populations (MERP). The current study conducted a narrative systematic review of contemporary Canadian genetics literature to investigate the extent to which MERPs have been included in and represented by Canadian social genomics research in the past two decades. The objective of the current study was to synthesize the current relevant literature to gauge the inclusion of populations of diverse ancestral backgrounds and to identify research gaps to promote more inclusive, diverse, and equitable social genomics research initiatives in Canada. Methods: The search strategy was run through the Web of Science Core Collection, Web of Science BIOSIS Citation Index, PubMed, Medline, PsycINFO, Embase, and Scopus. Empirical studies using quantitative genetics designs (i.e., twin design) or molecular genetics designs (i.e., GWAS, candidate genes, polygenic scores) were included for review when relevant social genomics outcomes (e.g., self-esteem, parenting, academic achievement, substance use) were assessed. Two independent reviewers assessed the titles and abstracts of potentially relevant articles. Full-text copies were reviewed for all articles that met the initial screening criteria. Several data were extracted from included studies: average age and age ranges, sex and gender composition, racial/ethnicity compositions (e.g., White, Asian, Black, Latino, Indigenous), sample geographic regions, study design (cross-sectional, longitudinal), study outcomes (e.g., mental health outcomes, socioemotional measures), year of publication, and the total sample size. Study quality was assessed by examining the quality of reporting for sample characteristics, ethnicity reporting, sample representativeness, and considerations for intersections between ethnicity and sample characteristics on study outcomes. Results: Twenty-nine studies met the criteria for full review. Years of publication ranged between 1998- 2023. Study design frequencies were as follows (candidate gene: n = 14, polygenic risk: n = 7, Genome-wide association studies: n = 6, twin: n = 3). Studies were conducted with samples across six Canadian provinces (Quebec: n = 13, Ontario: n = 6, Alberta: n = 3, Manitoba: n = 2, British Columbia: n = 2, Newfoundland: n = 1). Of the studies that provided partial or detailed sample ethnicity reporting (~69%), all samples were predominately White. Conclusions: MERPs currently constitute a sizeable portion of the Canadian population. However, ethnic/racially diverse populations are not substantially included in contemporary Canadian social genomics research. Including diverse populations in social genomics research is an important next step for human genetics research in Canada.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 177
Presenter: Rebecca Tan
Supervisor: Alexander, R Todd
Title: Calcium-sensing receptor signaling is amplified in patients with a FAM111A gene mutation
Authors: Rebecca Tan, Peter Zhao, Todd Alexander

Theme: Children's health and well-being

Introduction: A six-year-old female presented with seizures, low blood calcium (Ca2+), low parathyroid hormone (PTH) and increased urinary Ca2+ excretion. She was diagnosed with Autosomal Dominant Hypocalcemia (ADH), a childhood disorder characterized by low blood Ca2+ and inappropriately low PTH. She had no mutations in genes known to cause ADH (Ca2+-sensing receptor (CASR) and G-protein subunit alpha 11 (GNA11)). Consequently, we performed whole exome sequencing and a trio analysis that identified a novel FAM111A gene mutation (c.1454G>A, p.C485Y). Although FAM111A is a protease, the specific protein targets are unknown. In addition, FAM111A regulates DNA replication and thus gene expression. Interestingly, FAM111A gene mutations cause Kenny Caffey syndrome (KCS) and Osteocraniostenosis (OCS), conditions characterized by low blood Ca2+, low PTH, short stature and bony abnormalities. The molecular mechanism mediating these phenotypes are unknown. We hypothesize that mutations in FAM111A cause increased CASR signaling, resulting in low blood Ca2+ and high urine Ca2+ levels. The CASR is a G-protein coupled receptor, which upon activation by extracellular Ca2+, initiates signaling cascades that increase intracellular Ca2+ levels and decrease cyclic adenosine monophosphate (cAMP). CASR activation also increases the expression of the tight-junction protein claudin-14 (CLDN14). In the kidney, CLDN14 blocks Ca2+ reabsorption leading to increased urine Ca2+ excretion and lower blood Ca2+. Our objective was to determine if FAM111A wild-type (WT) suppresses CASR signaling and if the mutants fail to do so. Methods: Human embryonic cells (HEK293) were transfected with empty vector (EV) as a control, CASR and EV, FAM111A WT with EV or CASR and FAM111A WT or mutants (C485Y, ADH; Y511H, KCS; R569H, KCS; T338A, OCS; P527R, OCS; D528G, OCS; S541A, inactivated protease). We performed Fura2AM imaging of intracellular Ca2+ in transfected cells in the presence of increasing extracellular Ca2+ (0.5-11.3 mM) levels. Also, as an indication of CASR activity, we measured CLDN14 expression and cAMP levels, in transfected cells incubated in 0.5 mM or 5 mM extracellular Ca2+, via a dual luciferase assay and cAMP assay kit, respectively. Results: The change in peak intracellular Ca2+ concentration was two times higher ($p<0.05$) in cells with CASR plus EV or FAM111A mutants, compared to EV or FAM111A WT plus CASR. Similarly, luciferase activity as an indication of CLDN14 levels, was significantly higher ($p<0.05$) in CASR plus EV compared to EV and FAM111A WT plus CASR. Some mutants (C485Y, T338A, P527T, D528G, S542A) had similar CLDN14 levels to CASR plus EV, while others (Y511H, R569H) showed similar levels to FAM111A plus CASR. The cAMP levels were not different in cells with CASR and FAM111A WT compared to CASR with FAM111A mutants. Conclusions: FAM111A WT attenuates CASR activity. All FAM111A mutations assessed, enhanced CASR activity when measured by an increase in intracellular Ca2+. Some mutants increase CLDN14 expression, while others may affect a different CASR signaling pathway. Elucidating the mechanism of how FAM111A affects CASR activity and Ca2+ homeostasis will provide a better understanding of our patient's condition as well as those with KCS or OCS.

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 180
Presenter: Jadynn Gansauge
Supervisor: Scott, Shannon
Title: An Exploration of the Self-Care Behaviours Practiced by Parents of Children with Pediatric Heart Failure: A Qualitative Content Analysis
Authors: Jadynn Gansauge, Ziad Zahoui, Chentel Cunningham, Shannon Scott

Theme: Children's health and well-being

Introduction: Pediatric heart failure has a high mortality rate and requires complex care. With increased disease severity, a variety of interventions are required, including strict care regimens and multiple hospital stays. Consequently, this can place a significant psychosocial burden on the parents or caregivers who provide care. Often, they experience high levels of stress and a reduced capacity to cope with their child's illness. Coping in this context is known as self-care behaviour. Therefore, the purpose of this secondary study is to explore the nature of self-care behaviours performed by parents of children with pediatric heart failure. Methods: A secondary analysis of previously collected interview data from a qualitative descriptive is currently in progress. 11 parents of children diagnosed with pediatric heart failure at the Stollery Children's Hospital in Edmonton, Alberta, participated in the primary study. Quantitative demographic data and qualitative interview data exploring parents' information needs and experiences have been previously collected. Content analysis is being performed by two researchers, and journaling has been completed after reading through each interview to recognize bias and preconceptions before coding the data. Coding of the data was completed independently and codes were then compared and contrasted. Conflict resolution was also completed collaboratively for any conflicts which arose throughout coding. Results: This study is ongoing. Preliminary review of the data reveals parents of children with pediatric heart failure practice both adaptive and maladaptive self-care behaviors. Adaptive behaviours include pursuing hobbies, having relationships, and spirituality. Maladaptive behaviours include loss of identity and total focus on children. Furthermore, a sub-category relating to parental maladaptive and adaptive behaviours was also identified which highlighted how participants occasionally failed to recognize the adaptive behaviours they practice. Expected outcomes: The results of this study will provide insight into the experience of parental coping behaviours when caring for a child with heart failure. The goal is to highlight the complexity of self-care behaviours of parents placed in this difficult context. The research will help to understand the parental perspective to potentially develop areas of improvement for clinicians in practicing family-centered care for this population.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 184
Presenter: Tanin Shafaati
Supervisor: Ussher, John Edward
Title: Treatment with the Sodium-Glucose Cotransporter-2 Inhibitor, Empagliflozin, Does Not Improve Cardiac Abnormalities in a Mouse Model of the Rare Genetic Disease Barth Syndrome
Authors: Amanda A. Greenwell, Tanin Shafaati, Christina T. Saed, Seyed Amirhossein Tabatabaei Dakhili, Jordan S.F. Chan, Kunyan Yang, Jennifer Kruger, Farah Eaton, Keshav Gopal, John R. Ussher

Theme: Children's health and well-being

Introduction: Barth Syndrome (BTHS) is a rare genetic disease characterized by deficiency of tetralinoleoyl cardiolipin, secondary to mutations of TAFAZZIN, which often results in mitochondrial dysfunction leading to the infantile development of cardiomyopathy. The cardioprotective effects of sodium-glucose cotransporter-2 inhibitors, such as empagliflozin, which are glucose-lowering medications used in the treatment of type 2 diabetes, have now been established in heart failure with reduced and preserved ejection fraction. Empagliflozin has been proposed to induce cardioprotection by increasing circulating ketone levels, thereby increasing myocardial ketone oxidation for ATP production. As a tetracycline-inducible TAFAZZIN knockdown mouse model (herein referred to as TazKD mice) mimicking BTHS has been reported to have increased capacity for ketone oxidation in the heart, we hypothesized that empagliflozin may improve cardiovascular outcomes in TazKD mice. Methods: TazKD mice and their wild-type (WT) littermates at 8-weeks of age were randomized to treatment with either empagliflozin (10 mg/kg) or vehicle control (0.5% hydroxy ethyl cellulose) once daily via oral gavage for 7-weeks. Cardiac function was assessed by ultrasound echocardiography at baseline and following treatment. Body composition measurements were determined via EchoMRI and exercise capacity was assessed via forced running of mice on a motorized treadmill. Results: Consistent with our previous studies, TazKD mice exhibited development of hypertrophic cardiomyopathy as evidenced by a reduction in the diastolic left ventricular diameter and volume, however, systolic function, measured through ejection fraction, was preserved. Treatment with empagliflozin did not lead to an improvement in parameters of cardiac structure and function. Consistent with growth retardation and muscle atrophy associated with the BTHS phenotype, TazKD mice also displayed a trend towards a reduction in body weight, fat mass and lean mass. Forced treadmill testing revealed that TazKD mice ran a shorter distance than their WT littermates, and this was not improved by treatment with empagliflozin. Conclusion: Our findings suggest that treatment with empagliflozin did not improve cardiac parameters in TazKD mice, and therefore, may not represent a viable pharmacological therapy for the treatment of BTHS.

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 185
Presenter: Emily Bonisteel
Supervisor: Nagpal, Taniya
Title: It's all in the beliefs: How beliefs about obesity may relate to behavioural assumptions during pregnancy
Authors: Emily A. Bonisteel, Kirina Angrish, Taniya S. Nagpal

Theme: Pregnancy and developmental trajectories

Introduction: Prenatal healthcare environments are described as a key source of weight stigma for pregnant individuals who have obesity. Weight stigma, defined as social misconceptions and stereotypes surrounding weight, can be a barrier to equitable healthcare for those who have obesity during pregnancy, and can negatively impact the patient-provider rapport. Prenatal healthcare providers report they feel pregnant populations who have obesity lack self-management behaviours (e.g., poor diet or physical inactivity), which is consistent with the dominant social narrative that assumes obesity is solely caused by poor health behaviours. There are several integral health benefits of being physically active, eating nutrient dense meals, and getting quality sleep in pregnancy that need to be conveyed to the pregnant patient. Prenatal healthcare providers see patients throughout their pregnancy, so it is important that they are providing quality care that incorporates information on health behaviours in a sensitive way and free from stigmatization. The primary objective of this exploratory study was to assess the correlation between prenatal healthcare provider's beliefs about obesity and their assumptions towards lifestyle behaviours in pregnancy (i.e., physical activity, nutrition, sleep), and gestational weight management. Methods: An online cross-sectional survey was administered for Canadian prenatal healthcare providers to assess their weight-related attitudes and assumptions towards lifestyle behaviours in pregnant individuals who have obesity using the Beliefs About Obese Persons (BAOP) and Assumptions about Lifestyle Behaviours for Pregnant Patients Who Have Obesity scales. The BAOP scale measures the degree to which prenatal healthcare providers believe that obesity is or is not within individual control, with a higher score indicative of greater bias. The lifestyle assumptions scale was created for this study to assess the prenatal healthcare provider's assumptions towards lifestyle behaviours during pregnancy, obesity, and gestational weight management. A higher score indicates poor assumptions towards lifestyle behaviours for pregnant patients who have obesity compared to those without obesity (e.g., they are more likely to gain weight excessively, or more likely to not adhere to physical activity recommendations). A simple correlation between lifestyle behaviour assumptions and BAOP was run to assess the strength and direction of the relationship. Results: Seventy-two prenatal healthcare providers, including 37 obstetricians, 10 midwives, 19 family physicians, 4 prenatal nurses, and 2 professionals that preferred not to answer, completed the survey. A significant medium, positive correlation ($r= 0.458$, $n=72$, $p<0.001$) was found between BAOP and assumptions about lifestyle behaviours for pregnant patients who have obesity. Conclusion: The results confirm that a high obesity bias is related to poor assumptions about a pregnant person's health behaviours, and this may result negatively influence translation of important behavioural messaging. Further training on the complexities of obesity and preventing weight bias in prenatal care is needed to improve patient care, as well as improve counselling of healthy behaviours in pregnancy.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 186
Presenter: Nicholas Piroddi
Supervisor: Zwaigenbaum, Lonnie
Title: Diagnostic Stability in a Longitudinal Cohort of Younger Siblings of Children With Autism From Age 2 - 8
Authors: Nicholas Piroddi Lori Sacrey Lonnie Zwaigenbaum Jessica Brian Isabel Smith

Theme: Children's health and well-being

Introduction: Siblings of children with autism are considered to have an increased likelihood (IL) of autism. Significantly, there has been shown to be a delay in phenotypic presentation of IL siblings. The present longitudinal; study sought to characterize the change in diagnosis of younger IL siblings of children with autism at ages 2, 3, 5, and 8, and to determine if diagnosis status changed, persisted, or remitted over time (n=234). Methods: Autism characteristics were measured using the Autism Observation Scale for Infants (AOSI) and Autism Diagnostic Observation Schedule (ADOS) assessments and the Autism Diagnostic Interview - Revised (ADI-R) parent interview. The clinical characteristics of children diagnosed at ages 3, 5, and 8 were compared using measures of central tendency. Results: The main findings were (1) across the age groups, 80% of the children's diagnostic status remained stable (i.e. were diagnosed at age 2, and kept their diagnostic status at ages 3 and 5), (2) there was a 14% change in diagnostic status (defined as a child that was not diagnosed at age 2, but were diagnosed later on at age 3 or 5), and a 5% were varying, and 1% who were diagnosed with autism at age 2 did not meet criteria at later ages, and (3), there tends to be more diagnostic variation in females than in males. Conclusion: These results suggest that diagnostic status is stable across ages 2, 3, 5, and 8 for children with an IL for autism. These results suggest that medical professionals can feel confident in autism diagnoses given before the age of 4 (the typical average age of diagnosis). Yet, there is a possibility of delayed phenotypic presentation (diagnoses at age 5, 8, or beyond). For attrition, there was no significant differences between IL siblings who continued versus discontinued participation after age 3

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 187
Presenter: Weiying Chen
Supervisor: Lou, Edmond HM
Title: Accuracy of 3D Spinal Reconstructed Images using Machine Learning Algorithms for Children with Adolescent Idiopathic Scoliosis
Authors: Weiying Chen, Marek Reformat, Edmond Lou

Theme: Children's health and well-being

INTRODUCTION: Adolescent idiopathic scoliosis (AIS) is a three-dimensional spinal disorder coupled with lateral curvature, axial vertebral rotation and sagittal abnormality. Approximately 3% of adolescents have AIS. To assess and monitor the progression of this spinal disorder, children attending the initial scoliosis clinics usually require taking posteroanterior (PA) and lateral (LAT) spinal radiographs simultaneously. Curvature parameters were measured manually on both PA and LAT radiographs. Reconstructing spinal images in 3D can provide better visualization, assessment and treatment planning. However, manually reconstructing 3D spine images is very time consuming and adds human variation. This study aimed to develop an automatic method to reconstruct 3D spinal images, extract curvature parameters and evaluate the accuracy of the developed method. METHOD: Dataset: Chart review ethics approval was granted from the local health ethics board. PA and LAT spinal radiographs, which were acquired by the EOS X-ray system, were exported from the Edmonton Scoliosis Clinics. In total 380 biplanar radiographs were randomly selected from the database; among those 304 (80%) paired images were used for machine learning algorithm training and 76 (20%) were used for testing the measurement accuracy. Machine Learning Algorithms: Firstly, several convolutional neural networks (CNN), the most commonly used segmentation method for medical imaging, were used to automatically extract 2D anatomical landmarks from both PA and LAT radiographs. Then, the identified landmarks were used for a 3D/2D vertebrae registration from T1 to L5 to obtain the 3D spinal images. Assessment: To assess the accuracy, 4 clinical parameters: Cobb angle (CA), axial vertebral rotation (AVR), kyphotic angle (KA) between T1 to T12, and lordotic angle (LA) between L1 to L5 were used to compare the manual versus the automatic measurements. The mean absolute difference and standard deviation (MAD±SD) between the two measurements' methods were used to report the results. The percentages of the automatic measurements within the clinical acceptance errors for CA and AVR (both are 5°) as well as the KA and LA (both are 9°) were calculated. The average speed of getting a 3D spinal image was reported. RESULT: The machine learning algorithms method was successfully developed to reconstruct 3D spinal images based on biplanar radiographs. For 76 test paired images, 121 spinal curves were identified and measured manually, in which the average CA, AVR, KA and LA were 31.2o±11.6o, 8.6o±6.1o, 32.2o±12.4o and 45o±11.3o, respectively. The automatic method can identify all the curves. The MAD±SD for CA, AVR, KA and LA were 3.7o±3.8o, 3.4o±5.6o, 4.5o±6.7o and 2.6o±5.1o, respectively. The clinical acceptance percentage of automatic measurements for CA, AVR, KA, and LA were 98.8%, 98.6%, 98.2% and 98.1%, respectively. The average time to generate 3D spinal images (n=76) was 5.15±1.19 seconds when using a PC with an Intel® I7 CPU and 16 GB RAM. CONCLUSION: This study reported a fast reconstruction method to display 3D spinal images with interpretable visualization results. The spinal curvature parameters were able to be extracted automatically and 98% of them were within the clinical acceptance errors.

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 188
Presenter: Navdeep Badhan
Supervisor: Bourque, Stephane
Title: Maternal iron deficiency induces a maladaptive response to iron homeostasis within Spontaneously Hypertensive Rats
Authors: Navdeep Badhan, Jad-Julian Rachid, Si Ning Liu, Stephane Bourque

Theme: Pregnancy and developmental trajectories

Introduction: Iron deficiency (ID) is the most widespread nutritional deficiency worldwide, with around 38% of pregnant women experiencing ID due to inadequate iron intake and increased demand due to fetal development. The hormone hepcidin is a master regulator of iron homeostasis and acts by degrading the import protein ferroportin. Its gene, Hamp1, is downregulated in ID to promote iron absorption via the SMAD pathway. However, whether the mechanisms that control iron metabolism are affected during pregnancy, and whether coincidence of hypertension in pregnant dams further impairs hepcidin regulation is unknown. We hypothesized that iron metabolism is impaired in pregnant spontaneously hypertensive rats (SHR) compared to normotensive Wistar Kyoto (WKY) rats. Methods: Eight-week-old SHR and WKY rats were either fed an iron-restricted (3mg/kg) or an iron-replete (37mg/kg) diet prior to and during gestation. On gestational day 21, dams were euthanized, liver tissue was excised, and flash frozen for gene expression assessment by RT-qPCR. Data was analyzed by 2-way ANOVA with Holm-Sidak post hoc test. Results: Dietary iron restriction reduced maternal hemoglobin levels in SHR and WKY dams compared to iron-replete counterparts ($P_{ID}<0.0001$). In both ID-SHR and ID-WKY dams, expression of transferrin receptor 1 (Tfrc) showed increased levels (1600% ; $P<0.0001$) alongside cellular iron transporter Slc11a2 (50%; $P=0.04$). Hepcidin (Hamp1) expression was significantly decreased in both ID treated groups (99.9% for both; $P<0.0001$). While endogenous hepcidin regulator, Bmp6, was increased within WKY rats compared to SHR irrespective of ID treatment ($P_{strain}<0.0001$). Downstream cellular regulators, Smad1 and Smad5, expression showed to be increased in ID-SHR dams (61.5% and 46.4%, respectively), though unchanged in ID-WKY dams ($P_{int}=0.01$ and $P_{int}=0.04$, respectively). Nuclear signal translocator Smad4 expression showed a similar trend, being increased in ID-SHR dams by 41.9% but unchanged in ID-WKY dams ($P_{int}=0.04$). Conclusion: These results suggest ID during pregnancy in the SHR affects iron homeostasis, which could have important implications for maternal health as well as growth and development of the offspring.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 189
Presenter: Astha Burande
Supervisor: McBrien, Angela
Title: Recent trends in diagnoses, outcomes and genetic etiologies of Primary Fetal Cardiomyopathy
Authors: Astha Burande, Lisa Hornberger, Oana Caluseriu, Jennifer Conway, Christy Cooke, Sue Chandra, Angela McBrien

Theme: Pregnancy and developmental trajectories

Introduction: Fetal cardiomyopathy (FCM) is a rare condition affecting 8.24 per 100,000 live births, with reported neonatal mortality between 50% to 82% (varying by FCM subtype). Around 50% of FCM cases are idiopathic, with 30% having extra-cardiac anomalies identified prenatally. Over the last decade, significant strides have been made in fetal cardiac screening, genetic testing, perinatal and postnatal management. These changes may have impacted the likelihood of survival and diagnosing an underlying etiology, therefore we sought to investigate these factors in a recent cohort of cases with FCM. Methods: We conducted a single-center retrospective study of cases with primary FCM diagnosed over a 5 year period (Jan 2017 - Dec 2021). Cases were identified using the fetal cardiology database, echo reports and fetal and postnatal charts were reviewed. Results: Fifteen cases of primary FCM were diagnosed at a mean gestational age of 24+4 weeks. FCM subtypes were as follows: 33% (5/15) non-compaction cardiomyopathy (NCM), 27% (4/15) restrictive cardiomyopathy (RCM), 20% (3/15) dilated cardiomyopathy (DCM), 13% (2/15) mixed cardiomyopathy (MCM), and 7% (1/15) with left ventricular (LV) aneurysm. For pregnancy outcomes, 13% (2/15) underwent termination of pregnancy, 13% (2/15) experienced intrauterine fetal death and 73% (11/15) were live births. Hydrops was present at diagnosis in 13% (2/15), increasing to 40% (6/15) by delivery. Prenatally, 33% (5/15) received diagnoses of extra-cardiac structural anomalies. Postnatally/at postmortem significantly more had extra-cardiac diagnoses identified (77%, 10/13, p=0.03). Prenatally, extra-cardiac diagnoses affected the following systems: 13% (2/15) skeletal, 13% (2/15) neurological, 13% (2/15) urogenital, 7% (1/15) gastrointestinal, 7% (1/15) were respiratory, and 7% (1/15) placental. Following birth, extra-cardiac diagnoses were: 54% (7/13) skeletal, 46% (6/13) neurological, 23% (3/13) urogenital, 15% (2/13) gastrointestinal, and 23% (3/13) respiratory. Two fetuses had complete AV block and one had ventricular tachycardia. Maternal digoxin therapy was used to support fetal heart function in 27% (4/15) of cases. Outcomes by 1 year postnatally included: 55% (6/11) were alive with survival varying by phenotype: 100% (2/2) for MCM, 50% (2/4) for NCM, 50% (1/2) for RCM (25%), 50% (1/2) for DCM, and 0% (0/1) for LV aneurysm. Extracorporeal membrane oxygenation was used for 18% (2/11) and 17% (3/11) had a ventricular assist device, including 1 case needing both. Cardiac transplantation was performed in 67% (2/3) of those listed. Genetic testing was done in all cases except 2 (one of whom had a previously confirmed familial pathogenic mutation). Genetic testing was performed prenatally in 47% (7/15) and postnatal/postmortem in 67% (10/15). Results indicated a likely/ known genetic cause in 60% (9/15) of the cases. By subtype, likely/known genetic etiology was found in 100% (2/2) of MCM, 60% (3/5) of NCM, 75% (3/4) of RCM, 33% (1/3) of DCM, and 0% of LV aneurysm. Conclusions: Our study showed that extra-cardiac diagnoses are common in FCM and postnatally, the yield increases. The majority have an identifiable confirmed/likely underlying genetic diagnosis. Outcomes remain relatively poor overall.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 190
Presenter: Daniel McClement
Supervisor: Wine, Eytan
Title: Predicting response to exclusive enteral nutrition induction therapy in children with Crohn disease using clinical data
Authors: Daniel McClement, Ricardo Suarez, Eytan Wine

Theme: Children's health and well-being

Introduction Exclusive enteral nutrition (EEN) is a first line therapy for the induction of remission in luminal pediatric Crohn Disease (pCD), achieving a remission rate of around 80%. However, patients who are unresponsive to EEN often endure significant physical, mental, and financial burden and spend weeks consuming an unpalatable diet before being switched to an alternative treatment regimen. The aim of this study is to build a machine learning model capable of identifying EEN non-responders from clinical data routinely collected at the time of diagnosis to allow for more personalized treatment plans, using a robust, national dataset. Methods A prospectively-followed cohort of pediatric patients, who were prescribed EEN as their first treatment after being diagnosed with CD (n=308), was collected through the Canadian Children Inflammatory Bowel Disease Network (CIDsCaNN) inception cohort (2013-2020). Patients with weighted Pediatric Crohn Disease Activity Indexes (wPCDAI) collected after at least 4 weeks on EEN were compiled into a dataset (n=108). Patients were labelled as EEN responders if their wPCDAI after EEN induction was < 12.5, indicating successful remission [non-responders n=46 (43%), responders n=62 (57%)]. The dataset contained the following baseline clinical data: blood test results (Hgb, ESR, CRP, Alb, Htc, Plt), Paris Classifications, height and weight Z-scores, as well as wPCDAI, SES-CD (simple endoscopic score, CD), PGA (physician global assessment), and Mayo scores. The classes of other therapeutics (steroids, biologics, immunomodulators) prescribed concurrently with EEN were used as additional features in the dataset. Pediatric Ulcerative Colitis Activity Indexes (PUCAI) were also included to serve as a surrogate measure of colonic CD. Odds ratios were calculated to determine whether any features correlated with response to EEN induction therapy. Several machine learning classifiers for predicting response to EEN were also built and cross-validated. Results PGA scores were found to be predictive of response to EEN induction. An increase in PGA score (e.g. moving from "mild disease" to "moderate disease") correlated with an increased likelihood of EEN failure (Odds Ratio 3.1, 95% CI [1.7,5.8], p=0.0001). PUCAI scores were also predictive of response to EEN induction. Higher PUCAI scores correlated with an increased likelihood of EEN failure (Odds Ratio 1.4 for a 10-point PUCAI increase, 95% CI [1.07,1.7], p=0.009). The best classifier for predicting EEN response was a random forest built using only four features from the dataset: PGA, PUCAI and SES-CD scores, and Htc. The classifier achieved an area under the ROC curve of 0.75 ± 0.07. Conclusion Higher PGA, PUCAI, and SES-CD scores show potential for predicting patients less likely to respond to EEN induction. Higher PUCAI scores may indicate distal colonic CD which is associated with more severe disease phenotypes. Likewise, lower Htc levels demonstrate predictive power and have previously been identified as a marker of complicated CD behavior. Overall, these findings suggest that more severe disease activity at the time of diagnosis is associated with reduced efficacy of EEN induction therapy.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 192
Presenter: Umme Sabrina Haque
Supervisor: Yokota, Toshifumi
Title: Enhancing Therapeutic Efficacy in Spinal Muscular Atrophy: DG9-PMO Conjugates Amplify Cellular Uptake, Nuclear Localization, and Long-term Benefits in a Murine Model
Authors: Umme Sabrina Haque, Melissa Kohut, Rika Maruyama, Toshifumi Yokota

Theme: Children's health and well-being

Introduction: Spinal Muscular Atrophy (SMA) is an autosomal recessive neuromuscular disorder characterized by progressive muscle weakness and atrophy. It is also one of the leading causes of infant death. This disease is caused by mutations in the survival of the motor neuron 1 (SMN1) gene. A paralogous gene, SMN2, encodes the vital SMN protein but generates only minimal levels due to a sequence variant leading to the exclusion of exon 7 from approximately 90% of mature transcripts. Antisense oligonucleotide (ASO)--based therapies have emerged as a promising approach to treat SMA by targeting the SMN2 gene. Although the FDA-approved ASO, Nusinersen, has demonstrated efficacy in SMA treatment, its application is marred by invasive intrathecal injections, substantial cost, and limited impact on the broader multi-organ manifestations of SMA. Notably, SMA is now recognized as a multi-organ condition involving the heart, liver, thymus, and spleen, rather than just a motor neuron disease. To address these limitations, we recently developed DG9-a novel moiety modified from a human T-cell peptide, and showed that DG9-PMO exhibits a remarkable capacity to augment the cellular uptake of ASOs, eliminating the need for intrathecal injections. Here, we examined the long-term efficacy of DG9-PMO with multiple injections, as well as its capacity to enhance endosomal escape and nuclear targeting. Methods: A severe SMA mouse model was utilized to evaluate the therapeutic effects of DG9-PMO conjugates. We injected 40 mg/kg DG9-PMO into a severe SMA mouse model subcutaneously on postnatal day 0, day 2, day 28, and day 56 to determine the in vivo efficacy. Cellular uptake and endosomal escape of DG9-PMO were assessed by immunocytochemistry and live imaging using confocal microscopy. The therapeutic efficacy was evaluated by survival rates, weights, and functional tests to assess the motor function. Results: Our results indicate that multiple injections of DG9-PMO increase the survival rate and weight in the SMA mouse model without requiring intrathecal injections. Functional assessment data demonstrated increased motor ability in the DG9-PMO-treated mice, indicating remarkable amelioration of motor deficits, and improved locomotor activity, muscle strength, and coordination. Notably, DG9-PMO prevents necrosis better than MOE (molecule equivalent to nusinersen) as indicated by the mice's tail lengths. DG9 was also found to greatly improve intracellular uptake, endosomal escape, and nuclear localization of PMO, as evidenced by increased fluorescent signals. Conclusion: In this study, DG9-PMO conjugates displayed improved cellular uptake, nuclear localization, and therapeutic efficacy in a severe SMA mouse model. These results highlight the potential of DG9-PMO conjugates as a novel SMA therapeutic approach, providing hope for better patient outcomes.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 193
Presenter: Sumaiyah Shaha
Supervisor: Riddell, Meghan
Title: Par polarity complex member atypical protein kinase ζ-III regulates human syncytiotrophoblast fusion
Authors: Sumaiyah Shaha, Wendy Duan, Meghan Riddell

Theme: Pregnancy and developmental trajectories

Introduction The human syncytiotrophoblast (ST) is a giant single cell that comprises the maternal facing exchange surface of the human placenta. It is responsible for nutrient/gas exchange and acts as an immunological barrier. The ST expands and is maintained via fusion and differentiation of underlying progenitor cytotrophoblasts (pCT), that arise from trophoblast stem cells (TSC). Despite the importance of this process, mechanisms governing it are poorly understood. Recently, proteins that form the Par complex have been implicated in ST lineage differentiation. This protein complex is an evolutionarily conserved polarity regulator, but the individual complex proteins are also important for functions including cell differentiation. The complex consists of the scaffolding protein Par-3, Par-6, and atypical protein kinase C (aPKC) isoforms. We identified that trophoblasts express a unique N-terminally truncated aPKC-ζ isoform, aPKC-ζ III, along with kinase active aPKC-ι and aPKC-ζ. APKC-ζ III is structurally predicted to lack kinase activity and may be an endogenous dominant negative form capable of modulating function by competitive binding, but it's function in trophoblasts is unknown. Thus, we examined whether aPKC-ζ III may regulate ST differentiation. Methods First trimester and term human isolated pCTs, and TSC were evaluated for ST fusion +/- aPKC kinase inhibitor and measured by counting the proportion of multinucleated structures. Using a 3D model of first trimester ST regeneration, explants were cultured +/- aPKC kinase inhibitor or PRKCZ targeting siRNA and assessed for ST fusion. A human pCT cell line, BeWo cells, were treated with PARD3 targeting siRNA and assessed for YAP/TAZ localization via immunofluorescence staining. Results ST fusion was reduced only by knock down (KD) with PRKCZ-targeting siRNA that decreases aPKC-ζIII and full length aPKC-ζ ($n=9$ $p<0.05$), but aPKC kinase inhibitor did not affect fusion. This suggests that aPKC-zIII, which lacks kinase activity, is important for pCT fusion. APKC-ζ III is predicted, to bind to the Par complex member Par-3. Par-3 is known to modulate the Hippo signaling transcriptional co-factors YAP and TAZ. These co-factors repress ST fusion. KD of Par-3 in BeWo cells increased cytoplasmic YAP/TAZ localization and therefore inactivation. Conclusion ST fusion was reduced with aPKC-ζ isoforms KD but increased with Par-3 KD. These findings reveal aPKC-ζ III regulates pCT to ST fusion. Our preliminary results reveal a kinase independent function of aPKC-ζ III and supports a model whereby aPKC-ζ III regulates fusion by competing with Hippo signalling regulatory components for Par-3, thereby modulating YAP/TAZ activation and fusion. Future directions include assessing direct aPKC-ζ III interactions with Par-3 via immunoprecipitation and PRKCZ knock out using pCT cell lines to assess their ability to undergo ST fusion +/- Par-3 KD. ST fusion is often disrupted in pregnancy complications. Thus, elucidating key mechanisms of ST differentiation could unveil potential therapeutic targets for treatment of placental pathologies.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 194
Presenter: Nicholas Brochez
Supervisor: Islam, Bonnieca F
Title: Assessing the usage of and barriers to using language interpretation services in a Canadian tertiary pediatric center: Stollery Children's Hospital language interpretation services (SCHLIS) survey
Authors: Primary Investigator: Dr. Nick Brochez Co-Investigators: Dr. Bonnieca Islam, Dr. Karen Forbes, Dr. Qaasim Mian

Theme: Children's health and well-being

Introduction: Canada has one of the highest immigration rates in the world per population with roughly 401,000 permanent residents welcomed in 2021. Immigrants account for about 20% of Canada's population yet account for 75% of its population growth; in 2016 Edmonton's immigrant population accounted for 23.8% of its total population. Limited-English proficiency (LEP) populations face barriers in accessing proper health care in systems such as Canada's, which mainly operates in English and French, and can have health care implications including delayed presentation, misdiagnosis, readmission due to poor medical compliance, decreased patient comprehension, and adverse events. It is important that health care providers be adequately trained in using language interpretation services (LIS) in patient care to improve the quality of care and reduce miscommunication. There is a lack of research in this area in pediatric populations. We sought to explore attitudes towards and the usage of LIS among different health care providers at the Stollery Children's Hospital (SCH). Methods: An online survey was developed and distributed to pediatric health care providers including pediatricians and pediatric subspecialists, residents/fellows, nursing staff, and various allied health providers at SCH. Survey completion was anonymous and voluntary; data collection occurred from October 2022-February 2023. Data analysis is underway with descriptive statistics for quantitative data and thematic analysis for free text responses. Results: A total of 345 respondents at the Stollery accessed the survey and 281 (81%) fully completed it. A variety of pediatric professions were captured with most responses stemming from nursing staff, residents and physicians, and other allied health workers. Preliminary results indicate that 20.4% of respondents report encountering a pediatric patient and/or their caregivers with a language barrier in English a few times per week, impacting the ability to communicate about their medical care. Nearly 50% of respondents report having received no training in using LIS in patient care, and only 3.6% reported having received formal training. Around 60% of respondents found that past LIS training in patient care was very beneficial to their role and 53.7% reported it increased their usage of LIS. Overall, in-person interpreters were perceived to be the most effective LIS modality followed by video and telephone interpreters. Barriers to using LIS included: not having the desired LIS modality available; insufficient time to use LIS for patient care; not having access to the desired language particularly Indigenous languages; and having an interpreter with limited ability to translate medical information. Conclusion: Preliminary data shows that half of respondents have not had formal training in LIS for patient care, although the value and need for use of LIS was evident. Identification of barriers and suggestions for overcoming these barriers are still being analyzed. This study will have important implications for LIS and patient care at SCH: we anticipate these results will inform potential educational and advocacy initiatives, policy change, LIS resource allocation, as well as increasing awareness of LIS and engaging further stakeholders.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 195
Presenter: Vikhashni (Winnie) Nagesh
Supervisor: Mackie, Andrew S
Title: Risk Factors for Invasive Pericardial Effusion Interventions Following Pediatric Cardiac Surgery
Authors: Nagesh, V., Chappell, A., Yaskina, M., Mackie, A

Theme: Children's health and well-being

Introduction: A pericardial effusion is the accumulation of excess fluid within the pericardial sac surrounding the heart. Pericardiocentesis is the standard of care for the treatment of large, hemodynamically significant pericardial effusions. Other procedures may also be used to evacuate pericardial effusions, including open surgical pericardial drainage. These are invasive procedures associated with morbidity, and therefore best avoided when possible. Identification of risk factors for the largest effusions requiring pericardiocentesis or surgical drainage has yet to be studied in the pediatric population. Early identification of high-risk patients may help clinicians optimize management in the postoperative period. The objective of this study was to identify risk factors that predispose pediatric patients to require invasive pericardial effusion interventions following cardiac surgery. Methods: Retrospective case-control matched study design including pediatric patients who underwent a cardiac surgical procedure between January 1, 2005, and July 1, 2020, at the Stollery Children's Hospital. Chart review completed to identify risk factors for those who underwent invasive interventions to treat pericardial effusions within two months of cardiac surgery (cases) compared to those who had an effusion but did not require invasive interventions (controls). Controls were matched 2:1 to cases on the basis of age (+/- 1 year) and surgery date (+/- 1 year). Results: There were 43 cases and 86 controls. On multivariable analysis, the use of steroids (OR 3.7, $p = 0.038$) and anticoagulation (OR 4.2, $p = 0.001$) in the post-operative period were associated with development of effusions requiring invasive interventions. Specifically, the use of unfractionated heparin (OR 4.0, $p = 0.024$) and the use of two or more anticoagulants had significantly higher odds (OR = 7.0, $p < 0.0001$) of undergoing interventions. Conclusion: We identified risk factors that predispose children to developing significant pericardial effusions that require invasive interventions post cardiac surgery: 1) Use of anticoagulation (particularly unfractionated heparin) and two or more anticoagulants, and 2) use of steroids, which may reflect confounding by indication. Patients who are on postoperative anticoagulants may benefit from close monitoring clinically and by echocardiography to watch for the development of an effusion. Being judicious in the use of anticoagulation in the post-operative period may be beneficial in preventing the development of significant pericardial effusions. Further studies on the role of anticoagulants in the development of pericardial effusions are needed.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 196
Presenter: Dania Al-Rimawi
Supervisor: Dyck, Jason R.B.
Title: Pharmacological inhibition of ROMO1 reduces cervical cancer cell proliferation
Authors: Dania Al-Rimawi, Matthew D. Martens, Yasser Abuetabh, Seyed Amirhossein Tabatabaei Dakhili, John R. Ussher, Jason R.B. Dyck.

Theme: Lifelong women's health

Introduction: In Canada, approximately 4 women/day are diagnosed with cervical cancer, with an estimated one third of these cases being fatal. Such a significant mortality rate suggests the need for more effective chemotherapeutic treatments for women with cervical cancer. Recent studies have suggested that a mitochondrial protein, Reactive Oxygen Species Modulator 1 (ROMO1), is upregulated in various cancer subtypes that involve the female reproductive system. Notably, this elevated ROMO1 protein expression has been correlated with metastasis and poor prognosis, especially in cervical cancer patients. Mechanistically, further studies have proposed that elevated ROMO1 expression and activity promotes cancer cell proliferation through activating the nuclear factor-kB (NF-kB) pathway. As it is well understood that NF-kB transcription factors play a prominent role in cancer progression and pathogenesis, ROMO1 may therefore be a key player in driving this pro-proliferative pathway and thus highlights ROMO1 as a potential anticancer therapeutic target of interest. Based on this, we hypothesized that pharmacological inhibition of ROMO1 may be an effective anti-tumour agent in cervical cancer and that reduced ROMO1 activity would lead to lessened NF-kB activation, thereby attenuating cancer cell proliferation. To explore this, we utilized in silico modeling to identify a novel pharmacological inhibitor of ROMO1 and investigated its ability to inhibit cervical cancer cell proliferation. We subsequently examined whether any observed differences in cervical cancer cell proliferation may be attributed to changes in NF-kB pathway signaling. Methods: Human cervical cancer cells were cultured and subsequently treated with either vehicle or ROMO1 inhibitor (6.25µM). After 24 hours, cellular metabolic activity, which is positively correlated with proliferation, was quantified using colorimetric MTT assays. To then assess the effect of ROMO1 expression on NF-kB activation, cervical cancer cells were treated with the inhibitor and cells were subsequently collected at various time points (0, 2, 4, 6, 8, 24 hours). Lysates were then subjected to western blot analysis for phosphorylated NF-kB expression levels. Statistical analysis was performed using t-test or one-way ANOVA, where appropriate. Results: Cervical cancer cells treated with the ROMO1 inhibitor exhibited a 56.1% (n=7) decrease in proliferation compared to vehicle-treated control cells. Consistent with our hypothesis, western blot analysis showed that phosphorylated NF-kB expression levels, an indicator of protein nuclear localization and activation, were significantly reduced in cervical cancer cells that underwent 8- and 24-hour drug treatment. Conclusion: Overall, our data show that direct pharmacological inhibition of ROMO1 effectively decreases cervical cancer cell proliferation in culture. Furthermore, our data suggest that longer durations of drug treatment lessen NF-kB activation, thereby providing a basis for further investigation into the specific mechanism by which ROMO1 influences cancer cell proliferation. Together, this work could lead to the development of an effective chemotherapeutic option to improve clinical outcomes for women with cervical cancer.

This research has been funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 199
Presenter: Anastasia Ambrose
Supervisor: Andrews, Saadet
Title: Neonatal encephalopathy: identification of underlying genetic causes
Authors: Anastasia Ambrose, Vann Chau, Vanda McNiven, Andreas Schulze, Dianne Wilson, Saadet Mercimek-Andrews

Theme: Pregnancy and developmental trajectories

Introduction: Neonatal encephalopathy (NE) is a clinical syndrome of disturbed neurologic function in the first days of life affecting 1-6/1,000 live-term newborns. Methods: To investigate the underlying genetic causes of NE, we applied genome sequencing (GS) in term newborns with NE. Newborns were enrolled according to inclusion/exclusion criteria during their Neonatal Intensive Care admission. GS trio was applied to DNA samples. Bioinformatic tools were applied to analyze GS trio data. We developed algorithms yielding 1-2 variants of interest per newborn. Manual filters were applied to remove variants of low genotype quality (GQ), low read depth (DP), low alternate allele frequency (ALF) and high population frequency (AF). Strict filters included GQ>20, DP>10, AF<0.001. Relaxed filters included GQ>20, DP>5, AF<0.005. Variants were analyzed by inheritance pattern and corresponding ALF. Pathogenicity was evaluated through in silico prediction and variant classification. In individuals without candidates, Human Phenotype Ontology terms were applied for data analysis. OMIM, mouse models and literature review were utilized to assess genotype-phenotype correlations and information for candidate genes. Protein modelling software was utilized to characterize structural protein modifications. Results: Seventeen newborns were enrolled. Features included seizures (n=14), respiratory distress (n=9), hypoglycemia (n=6), hypotonia (n=5), multi-organ dysfunction (n=1), macrocephaly (n=1), and dysmorphic features (n=1). We identified an OMIM disease in four individuals: PPP2R5D, BCOR, CFL2 and SCN2A diseases and confirmed clinically (23.5%). All OMIM disease diagnoses were identified in single nucleotide variants (SNV) data [missense (n=2), stop gain (n=1), frameshift deletion (n=1)]. We identified candidate genes in five individuals (29%). Three candidate genes were identified in SNV data (CTNND2, DST, SORCS2) (60%) while two were identified in copy number variants (CNV) data (CELF4, ASTN1) (40%). Conclusion: In conclusion, the diagnostic yield of GS was 23.5% for OMIM diseases. GS identified five candidate genes. GS is an effective tool for the identification of novel genetic diseases.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 202
Presenter: Yana Kibalnyk
Supervisor: Voronova, Anastassia
Title: Loss of Ankrd11 in the neural crest causes severe cardiac defects in a mouse model of KBG syndrome
Authors: Yana Kibalnyk, Ronan Noble, Maria Alexiou, Irina Poverennaya, Nicole L Dittmann, Amanda A. Greenwell, Kara Goodkey, John R. Ussher, Igor Adameyko, Daniel Graf, Stephane Bourque, and Anastassia Voronova

Theme: Pregnancy and developmental trajectories

Introduction. ANKRD11 (Ankyrin Repeat Domain 11) is a chromatin regulator and a risk gene for KBG syndrome, a rare developmental disorder characterized by multiple organ abnormalities, including cardiac defects. However, the role of ANKRD11 in heart development is unknown. Both craniofacial and heart development are shaped by the neural crest, an embryonic population of progenitor cells that is vital to organogenesis. The neural crest plays a leading role in embryonic heart development, and its dysfunction is implicated in many congenital heart defects. KBG patients show craniofacial and cardiac phenotypes consistent with neural crest dysregulation, making the neural crest an ideal target to study cardiac defects in a KBG model. Methods. Using a mouse model with conditional knockout of Ankrd11 in the neural crest (Ankrd11ncko), we performed morphological and functional analysis of the heart and lineage tracing analysis of the cardiac neural crest. Results. Ankrd11ncko embryos display a congenital cardiac defect termed persistent truncus arteriosus (PTA), ventricular dilation, and impaired ventricular contractility. We further show these defects occur due to aberrant cardiac neural crest cell organization and failure to initiate outflow tract septation. Finally, conditional knockout of Ankrd11 in the neural crest leads to impaired Sema3C (Semaphorin 3C) expression, and reduced mTOR (mammalian target of rapamycin) and BMP (Bone Morphogenetic Protein) signaling in the cardiac neural crest cells within the outflow tract. Conclusion. This study identifies Ankrd11 as a novel regulator of neural crest-mediated heart development and function and suggests a mechanism for aberrant heart development in KBG syndrome patients.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 203
Presenter: Bethan Wilson
Supervisor: Riddell, Meghan
Title: Single cell RNA sequencing identifies human decidua-specific endothelial cell subpopulations and adapting interactomes across the first trimester
Authors: Bethan Wilson, Wendy Duan, Meghan Riddell

Theme: Pregnancy and developmental trajectories

Introduction: An essential process to ensure pregnancy establishment is the conversion of the endometrial lining into the decidua. This transforms the endometrium into a highly vascularized tissue. The developing placenta and embryo are protected from maternal blood flow by placentally-derived cellular plugs until ~10 weeks gestational age (GA). Before this, the vasculature remodels in order to achieve proper blood flow to the placenta once the plugs loosen. Endothelial cells (EC) line the inside of blood vessels and coordinate vascular growth but very little is known about the cues that regulate EC adaptation in early pregnancy. The endothelium adapts to the specific needs of each organ system and integrates tissue-specific signaling and cell-cell interactions. This is supported by a murine EC single-cell transcriptomic atlas that demonstrated tissue-type-dependent gene patterns and EC heterogeneity, though this remains unexplored in the decidua. We hypothesize that the decidua adapts its vascular network, EC subpopulations and EC gene expression across the first trimester. Methods: Cells were isolated, GA 4-13 weeks (n=16) collected from the Women's Health Options clinic. cDNA libraries were constructed using 10X Genomics and sequenced at 20,000 reads/cell. Preprocessing and the interactome analyses [Nichenet package] were performed in R (Seurat). Gene ontology (GO) pathway analysis done using g:Profiler. Decidua tissue sections 1cm x 1cm x 0.3cm were stained using anti-CD31 (EC junctions), anti-ERG1/2/3 (EC mitochondria) and anti-cytokeratin-7 (fetally-derived invasive cells). Tissue was stained and cleared using the iDISCO protocol. Imaging was completed using light sheet microscopy. Results: A total of 1011 EC were sequenced (1.94% of all cells). EC sub clustering revealed 8 populations; arteries, capillaries, veins, lymphatics, proliferative, pro-inflammatory activated EC and progesterone receptor (PR+) 1 & 2. The GO analysis of PR+1 subcluster revealed increased blood vessel morphogenesis and response to stimulus. GO pathway analysis of all EC between GA samples showed the top down-regulated differentially expressed genes were associated with cell death and apoptotic processes in ≥10wks GA tissue, suggesting vascular pruning early in the first trimester. Multi-nichenet interactome analyses found the top ligand acting on EC <10wk GA was tumor necrosis factor-α (TNF- α) derived from multiple resident immune cell populations, whereas TGF-β derived from stromal cell populations dominated at >10wk GA. Conclusion: Pregnancy involves the increase in progesterone (P4) which can act directly on EC to increase migration, a process that is essential for vascular adaptation and forming new blood vessels. PR+ EC may be influenced by increasing P4 concentrations in a tissue-specific manner. The TNF- α signaling in <10wk GA EC may induce cell death and promote inflammatory EC activation pathways for leukocyte infiltration. This data identifying the cellular processes and specific pathways of decidual vascularization will lay the base for future work identifying decidua-specific targeted treatments to mitigate risk of pregnancy complications.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 205
Presenter: Dan Shimatu
Supervisor: Bourque, Stephane
Title: Decreased ketogenesis despite normal blood ketone levels during neonatal sepsis
Authors: Dan Shimatu, Ben Magalnick, Si Ning Liu, Kimberly Macala, Stephane Bourque.

Theme: Children's health and well-being

Introduction: Late-onset sepsis (LOS) is a serious medical condition triggered by the body's overwhelming response to an infection occurring after 72 hours of life, potentially leading to organ dysfunction and failure. Sepsis is characterized by systemic metabolic dysregulation. Ketones are a major source of energy produced by the liver, and especially important in neonates due to the increased intake of fatty acids through milk. Given that ketones are a major source of fuel for the body during starvation, we hypothesize that LOS will alter the neonate's ketone metabolism. Objective: Our goal was to explore the effects of LOS on ketogenesis in the liver at the mRNA level. Methods: Neonatal Sprague Dawley rats were given an intraperitoneal injection of fecal slurry (1.0 mg/g body weight) or vehicle (5% dextrose). The pups received buprenorphine for pain control and antibiotics with fluids at 4h and 16h post-injection. Circulating ketone levels and tissues were collected upon euthanasia. The liver was harvested and homogenized. RNA was then extracted from the homogenized liver and converted to cDNA which was used for RT-qPCR. Results: LOS caused systemic metabolic dysregulation observed through the biphasic blood glucose levels in both septic males and females across the first 24h post-injection. We ran RT-qPCR on the liver for the following ketogenesis related genes: Bdh1, Bdh2, Hmgcs2, Mct1, Cpt1α. Significant changes observed in males were: 41%, 50% and 84% ($P<0.0001$) down-regulation of Bdh1 at the 4, 8 and 24 hour timepoints, respectively. 40%, 55% and 66% ($P<0.0001$) down-regulation for Bdh2. 56%, 58% and 50% ($P<0.0001$) down-regulation for Hmgcs2. Significant changes observed in the females were: 35%, 25% and 83% ($P<0.0001$) down-regulation of Bdh1 at the 4, 8 and 24 hour timepoints, respectively. 39%, 39% and 64% ($P<0.0001$) down-regulation for Bdh2. 34%, 53% and 60% ($P<0.0001$) down-regulation for Hmgcs2. Interestingly, no significant changes in blood ketone levels at 4 or 24 hours post-injection. Overall, no sex differences were observed in both gene expression profiles and circulating ketone levels. Conclusion: An overall down-regulation of ketogenesis at the mRNA level was observed across all time points investigated despite no change in blood ketone levels. This suggests another mechanism is maintaining ketone levels. However, whether this reduction in ketogenesis at the mRNA level is protective or pathophysiologic requires further investigation.

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 206
Presenter: Jason Lane
Supervisor: Bhavsar, Amit
Title: Identifying signaling pathway targets to mitigate cisplatin-induced ototoxicity in paediatric cancer treatment
Authors: Jason Lane, Amit P. Bhavsar

Theme: Children's health and well-being

Introduction: Cisplatin is a highly effective chemotherapeutic drug for treating solid paediatric cancers. Unfortunately, cisplatin treatment has several adverse effects that limit its use and require dose reduction, or discontinuation of this life-saving chemotherapeutic. Notable cisplatin-induced toxicities include permanent hearing loss (ototoxicity) that occurs in ~50% of children treated with cisplatin. Cisplatin-induced ototoxicity (CIO) is caused by the damage and death of hair cells in the inner ear. These hair cells are important transducers of mechanical stimuli to electrical signals, but they do not replicate. In children, CIO can severely impact learning and socialization and is linked to long-term socio-economic and psychosocial deficiencies. We identified that Toll-like receptor 4 (TLR4) was a critical mediator of cisplatin toxicity. TLR4 is best known for being an immune receptor that detects bacterial infection. Our data indicates that cisplatin binds to TLR4 in a distinct manner from the bacterial agonist lipopolysaccharide (LPS). Upon agonist binding, TLR4 activates multiple signaling pathways through the recruitment of adapter proteins, including the canonical AP-1, NF-kB, and IRF-3 effector pathways. Nevertheless, a hallmark of signal transduction is the transfer of phosphate moieties between signaling proteins within a given pathway. Given the different mechanisms of binding between agonists, we hypothesize that the downstream signaling pathways will also show differences in activity with distinct phosphorylation patterns. Using these differences, we will identify signaling proteins specific to cisplatin signaling as targets to mitigate CIO in children.
Methods: We use an in-vitro model of CIO that show robust responses to cisplatin treatment. The House Ear Institute Organ of Corti 1 (HEI-OC1) cell line is derived from progenitor Organ of Corti cells from an embryonic mouse and has been used frequently for studies of ototoxicity and otoprotectants. The HEI-OC1 cells were treated with cisplatin or LPS for 30 minutes up to 24 hours and lysates were collected. Lysates were processed by western blot using phospho-specific antibodies to identify broad changes between the treatments. Results: Preliminary results show an upregulation of the NF-kB signaling pathway in the LPS treatment compared to the cisplatin treatment as soon as 30 minutes post-treatment. We hypothesize that the IRF-3 and AP-1 pathways will also show significant differences in signaling. Conclusions: We have shown that there are differences in signaling caused by the various agonists of TLR4. The broad differences we have found will be used as a guide to look for specific targets using mass spectrometry and phosphorylation site analysis. Using targets found through these methods, we will use small molecule inhibitors and genetic manipulation to examine each target and their effects on mitigating CIO.

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 207
Presenter: Amanda Santarossa
Supervisor: Kotelnikova, Yuliya
Title: Construct Validity of the Schedule for Nonadaptive and Adaptive Personality-Youth Version in Middle Childhood
Authors: Amanda Santarossa, Kelsie Slater, Yuliya Kotelnikova, Jennifer Mullen, Lee Anna Clark, Elizabeth P. Hayden

Theme: Children's health and well-being

Introduction: Research domains on child temperament and adult personality have historically developed independently, and little is known about how the nature and structure of temperament/personality changes across the lifespan (Rothbart & Bates, 2007). Late childhood-early adolescence (~10-13 years) involves major biological changes, identity development, increased importance of peers, and escalation of risky behaviors; collectively, these changes can be associated with interpersonal conflicts and psychopathology (Sawyer et al., 2018). Further, maladaptation may be expressed through personality, indicating the need for valid and reliable assessment of early maladaptive personality traits. Timely identification is important, as personality disorders characterized by elevated maladaptive traits and impairment across multiple domains of functioning can be difficult to treat, and there is a lack of evidence-based treatment options across the lifespan (Western et al., 2006). Accordingly, the goal of this study was to examine the structural and external validity of the Schedule for Non-Adaptive and Adaptive Personality-Youth Version (SNAP-Y; Linde et al., 2013) in a community sample of 12-year-olds. Method. Data from 205 community-dwelling children and their families were collected at multiple time points as part of a longitudinal study of child depression risk; the current study uses data collected at baseline (N=205; 47% boys; Mage =7.41; SDage=.30; Caucasian 88%) and age 12 follow-up (N=164; 45% boys; Mage =12.48; SDage=.50). At baseline, caregivers completed the Structured Clinical Interview for DSM-IV (SCID-IV; First et al., 1996). At age 12, youth completed measures of normal-range and maladaptive personality and psychopathology: the SNAP-Y (Linde et al., 2013), Big Five Inventory-Youth Version (BFI-Y; John et al., 1991), General Temperament Survey-Youth Version (GTS; Watson & Clark, 1995), Depression Self-Rating Scale (DSRS; Birleson, 1981), and Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1978). Results. A series of exploratory and confirmatory techniques were used to establish structural validity of the SNAP-Y, indicating that the obtained higher order three-factor structure is consistent with that shown repeatedly for other versions of the SNAP (e.g., Clark et al., 2014; Kotelnikova et al., 2015; 2019). However, due to notable factor overlap reflected in cross-loadings, we also examined an alternative bifactor model. Finally, external validity analyses, including indicators of youth normal-range personality and psychopathology as well as parent psychopathology, highlighted strong convergent and discriminant validity of the SNAP-Y higher order factor scales and provided some evidence supporting the tripartite model of anxiety and depression. Conclusions. Early identification of maladaptive personality traits has significant implications for timely prevention and intervention. The current study provided additional evidence of the SNAP-Y construct validity in younger age groups. Large scale multi-method, multi-informant longitudinal studies with lengthy follow-up periods are necessary to further disentangle the origin and trajectory of maladaptive personality traits in childhood and adolescence.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 210
Presenter: Annie Mabbott
Supervisor: Scott, Shannon
Title: Evaluation of pediatric knowledge translation tools for parents: a scoping review protocol
Authors: Annie Mabbott, MSc, RN Dr. Shannon Scott, RN, PhD, FCAHS, FCAN

Theme: Children's health and well-being

Background: Connecting parents to research evidence through knowledge translation (KT) initiatives has the potential to improve child health outcomes and reduce health system costs. KT tools provide evidence-based health information to parents in user-friendly formats (e.g., infographics, pamphlets, videos). Many tools on various child health topics have been developed to inform and empower parents' decision-making about their child's health. Developing, implementing, and disseminating these KT tools requires substantial resources, and evaluating their value and impact is critical to advance the science and justify investment. However, these evaluations are challenging and complex, and no current standards exist. The aim of this scoping review is to identify, review, and summarize existing evaluation approaches used for KT tools for parents about child health. Methods: A scoping review of the literature will be conducted to identify publications that focus on KT tools for parents on child health topics and describe their evaluation approaches. A systematic search co-developed with a research librarian has been conducted in three databases (Medline, EMBASE, and CINAHL). Search terms are based on the PCC (Population, Concept, Context) framework. Studies will be included regardless of study design. Included studies must contain an evaluation strategy aimed at understanding or evaluating a KT tool for parents about one or more child health topics. Study selection, quality appraisal, and data extraction will be conducted by two reviewers independently. Disagreements will be resolved by discussion and a third reviewer if required. Data to be extracted include type/format of KT tool, study design, details about evaluation approach, data analysis, and study outcomes. Expected Outcomes: This review will provide an overview of methodological approaches to the evaluation of KT tools for parents about child health topics. Results will be disseminated through peer-reviewed publications and conference presentations. The findings from this scoping review will be of interest to researchers and practitioners and inform future research and KT tool development, implementation, and evaluation.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 212
Presenter: Ammar Al-Aghbari
Supervisor: Yokota, Toshifumi
Title: Severe Skeletal Muscle Phenotype and Impaired Muscle Regeneration Capacity in the Complete Dystrophin Knockout Model Dmd-Null Mice
Authors: Ammar Al-Aghbari, Harry Wilton-Clark, and Toshifumi Yokota

Theme: Children's health and well-being

Introduction: Duchenne muscular dystrophy (DMD) is an inherited X-linked genetic disorder characterized by progressive muscle degeneration in skeletal and cardiac muscles predominantly affecting males at an early age. DMD is caused by a frameshift mutation in the DMD gene responsible for encoding dystrophin, a protein that helps maintain muscle integrity that is largely non-functional in DMD patients. While the mdx mouse model has been widely used in DMD research, limitations in recapitulating key disease phenotypes, such as mild skeletal muscle phenotype and delayed symptom onset, have prompted the exploration of an improved model. This study aims to characterize the skeletal and cardiac muscle phenotypes of the transgenic Dmd-null mouse model, where all 79 exons of the Dmd gene are deleted, leading to the absence of various dystrophin isoforms. Methods: We conducted a comprehensive study involving Dmd-null, mdx, and wild-type mouse models in both a 12-month natural history cohort and an exercise-induced cohort. Functional assessments encompassed treadmill, grip strength, running wheel, and rotarod tests, complemented by histology, echocardiography (ECHO), and electrocardiography (ECG). The natural history study spanned 12 months, with analyses performed every 3 months. The exercise-induced study involved rigorous treadmill exercise three times bi-weekly from 3 to 6 months of age. Results: Our functional tests revealed a pronounced skeletal muscle phenotype in Dmd-null mice, exacerbated by exercise. In contrast, mdx mouse model exhibited milder phenotypes with trends of improvement upon exercise. While natural history did not unveil cardiac changes among models, exercised Dmd-null hearts showed significant post-exercise cardiac strain, absent in mdx and WT hearts. Preliminary histological analysis indicated potentially reduced regenerative capacity in Dmd-null mice. Conclusion: Our study highlights the DMD-null model as valuable for DMD research due to its pronounced skeletal muscle phenotype, exercise-induced cardiac strain, and potential limitations in regenerative capacity. This model provides insights into DMD pathogenesis and the role of smaller isoforms of dystrophin in muscle regeneration and merits further exploration to deepen our understanding of the disease and potentially inform therapeutic strategies.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 220
Presenter: Hao Zheng
Supervisor: Zheng, Yao
Title: Pubertal timing and suicidal ideation and attempts: sex differences in the links through bullying and victimization and internalizing problems
Authors: Hao Zheng, M.Sc. and Yao Zheng, Ph.D.

Theme: Children's health and well-being

Suicide is the second leading cause of death for adolescents globally. Offset (both early and late) pubertal timing exposes adolescents to additional biological and psychosocial challenges, rendering them at increased risk for psychopathology. Few studies have examined the relations between pubertal timing and suicidal ideation and attempts, as well as associated underlying mechanisms. Participants were 29,099 Chinese adolescents (Mage = 12.8, 47.9% female) in a large scale epidemiology survey. Multi-group structural equation modeling was conducted to examine the associations between pubertal timing and suicidal ideation and attempts, the indirect effects through bullying and victimization and internalizing problems, and sex differences in these links. Early-maturing adolescents were at elevated risk for experiencing suicidal ideation and attempts. These effects were partly through bullying and victimization experiences and internalizing symptoms. Early-maturing male adolescents were more likely to engage in bullying and experience victimization, whereas female adolescents were particularly vulnerable to internalizing problems and suicidal ideation and attempts following victimization experiences. Late-maturing conferred risk for suicidal attempts among female adolescents. Indirect associations between late pubertal timing and suicidal ideation and attempts through experiencing victimization and depressive symptoms were stronger among female than male adolescents. The findings highlight the potent role of offset pubertal timing on adolescent suicidal ideation and attempts as well as sex differences in associated risk processes. The results also emphasize the importance of focusing on both mental health and social contextual changes elicited by offset pubertal timing among adolescents as intervention targets.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 221
Presenter: Laura Sevick
Supervisor: Pin, Sophia
Title: The use of direct oral anticoagulants for prevention of clot formation following gynecologic oncology surgery: a systematic review and meta-analysis of the clinical and cost effectiveness (In progress)
Authors: Laura Sevick, Kristin Black, Courtney Tromburg, Caitlin McClurg, Sophia Pin

Theme: Lifelong women's health

Introduction: Patients with gynecologic cancers are at high risk of venous thromboembolism (VTE) formation. Rates of VTE in this population have ranged from 2.85-40.8%, and VTE is the leading cause of death in cancer patients. Multiple strategies have been suggested to help mitigate this risk, particularly in the postoperative period. A recent systematic review showed that all international guidelines supported the use of low molecular weight heparin (LMWH) or Fondaparinux for VTE prophylaxis in the postoperative period. Direct oral anticoagulants (DOACs) have been proposed as another form of anticoagulation. These medications have been shown to be noninferior compared to LMWH in the prevention of cancer associated VTE. Additional studies in this area have been completed, but a comprehensive systematic review and meta-analysis of the clinical evidence has not been published. When comparing DOACs to other VTE prophylaxis, cost is also a consideration. A recent cost effectiveness analysis comparing apixaban to enoxaparin for women with gynecologic cancers in the postoperative period showed that apixaban could result in cost savings. Similarly, to the clinical effectiveness, a comprehensive review of the cost effectiveness literature has not been published. The aim of this study will be to summarize the clinical and cost effectiveness of the use of DOACs for gynecologic oncology patients in the postoperative period. Methods: A systematic review will be completed. A librarian has been consulted, and a comprehensive search to identify peer-reviewed literature has been performed using the following bibliographic databases: MEDLINE (via Ovid), Embase (via Ovid), Web of Science Core Collection, and Scopus (Elsevier). Reference lists of all eligible studies and any related systematic reviews were searched for any potentially relevant studies not captured through the search strategy. The 3 main concepts used to structure the search are venous thromboembolism, DOACs, and gynecologic cancers. No language restrictions will be imposed. DOACs are a novel treatment, and research and development only began in the last 2-3 decades, therefore only studies published since 2000 will be considered for inclusion. Included studies must be clinical or cost effectiveness studies examining the use of DOACs in the postoperative period for gynecologic oncology patients. Titles/Abstracts, full text review, data extraction, and assessment of risk of bias will be screened by two independent reviewers. Any disagreements in inclusion will be resolved through consensus, or the inclusion of a third reviewer where needed. Agreement will be measured using a kappa statistic. A standardized data extraction form will be used. Risk of bias will be assessed using study design appropriate risk of bias tools. A narrative synthesis will be completed for all included studies. If there is sufficient clinical and statistical homogeneity, measured using I2, meta-analysis will be performed to generate a pooled estimate of the effect of DOACs on VTE reduction. Results and Conclusions: Approximately 1000 abstracts have been identified. We hope that this study can help inform further studies and the adoption of DOACs for gynecologic oncology patients in Alberta.

This research has been funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 223
Presenter: Sarah Demedeiros
Supervisor: Montesanti, Stephanie
Title: Learning from the grandmothers: Bringing together traditional knowledge from the Grandmothers' Wisdom Network to promote maternal, child and youth well-being for healthy Indigenous families and communities in Alberta
Authors: Sarah Demedeiros Stephanie Montesanti Barbara Verstraeten

Theme: Pregnancy and developmental trajectories

Introduction Indigenous Elders are the cultural keepers and transmitters of Indigenous knowledge to younger generations and play key roles in promoting connections to traditional knowledge and culture, and restoring healthy family systems and strong communities. The Grandmothers' Wisdom Network (GWN) brings together five Indigenous grandmothers from Treaty 6, 7, and 8 and the Métis Nation of Alberta to support Indigenous families and set priorities for future research, policy and practice on maternal, neonatal, child and youth (MNCY) health. The GWN vision was to create culturally appropriate resources bringing together traditional teachings and cultural practices surrounding pregnancy, childbirth and early life to help families reconnect with traditional knowledge and culture, to strengthen kinship ties, and support the best possible life for Indigenous children. Through Indigenous storytelling, the grandmothers' knowledge was gathered during sharing circles, then synthesised into a booklet, titled Honouring the Satsuné /Naa'ahs /Notikwewak /Kokumak /Grandmothers' Sacred Teachings on the Gift of New Life. Methods Our knowledge synthesis project applied community-based research (CBR), including participatory action research (PAR) and Indigenous methodologies and knowledge. Through Indigenous Storytelling during the monthly virtual meetings and in-person sharing circles, the grandmothers shared Cree, Dene, Blackfoot, and Métis traditional teachings and ceremonial practices surrounding pregnancy, childbirth and early years of life passed down by their ancestors. A pipe ceremony was performed to start the project in a good way and each meeting started in prayer, following protocol. Results The research team synthesised the knowledge from the grandmothers into the creation of the booklet, including quotes and photographs from the grandmothers, a statement describing their vision, and a description of the seven sacred teachings as the foundation of the teachings, ceremonies and practices around pregnancy, childbirth and early life.Once artwork by an Indigenous artist is complete, the booklet will be ready for dissemination. A knowledge translation plan was co-designed with the grandmothers and is three-fold: 1) presentation of the booklet to the Indigenous MNCY (I-MNCY) Standing Committee to generate broad awareness across the province; 2) workshops with health care providers to support uptake in healthcare settings; 3) sharing circles with Indigenous birthworkers, aunties and parents in the communities. Conclusion This booklet serves as a culturally appropriate resource and knowledge translation tool intended for new or expectant Indigenous mothers, aunties and grandmothers to facilitate reconnection to culture and traditional ways of being. Through knowledge sharing, the grandmothers aim to strengthen family structures and promote resilience across Indigenous families and communities by providing women the ability to reconnect with their traditional roles as sacred givers of life. The GWN has secured funding from the Women and Children's Health Research Institute to support the dissemination of this booklet. Sarah Demederios' thesis will explore the use of the GWN booklet to support Indigenous mothers experiencing family violence.

This research has been funded by the Stollery Children’s Hospital Foundation and the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 226
Presenter: Amirhossein Rahmati
Supervisor: Elahi, Shokrollah
Title: Investigating the Mechanisms Associated with Impaired Immune Response in a Mouse Model of Breast Cancer
Authors: Amirhossein Rahmati, Shokrollah Elahi

Theme: Lifelong women's health

Breast cancer is the primary cause of mortality in women worldwide. This disease accounts for 25% of the total cancer cases and 15% of cancer-related death in women. In Canada, 1 in 8 women develop breast cancer over their lifetime, while 1 in 30 women die because of health complications related to breast cancer metastasis. Thus, breast cancer is a major public health concern, and its prevention and treatment must be a priority as advancements could greatly benefit the lives of countless women affected by this devastating disease. Triple-negative breast cancer (TNBC) refers to breast cancer cells with low/lack of estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor-2 (HER2) expression and they account for 15-20% of all breast cancers. The current treatment methods for metastatic cancer have been ineffective as patients with TNBC do not benefit from endocrine therapy. Red blood cells have traditionally been viewed as oxygen-carrying cells; However, their immature counterparts have immunosuppressive properties. Under normal physiological conditions in human adults, red blood cells are produced in the bone marrow. However, stresses such as anemia and cancer promote erythropoiesis outside of the bone marrow, referred to as "extramedullary erythropoiesis". This results in the abundance of erythroid precursors, defined as CD71+ erythroid cells (CECs), in the peripheral organs such as the liver, spleen, and blood. In mice, CECs co-express CD71 and TER119 but in humans, they co-express CD71 and CD235a. Our preliminary data demonstrate that CECs are expanded in the spleen and tumor tissues of an animal breast cancer model which resembles human TNBC. Therefore, we hypothesize that breast cancer cells modulate the hematopoiesis resulting in the expansion of CECs and collectively, these cells impair T cell response against the tumor by the expression of soluble factors (e.g. ROS and TGF-β) and cell-cell interactions (e.g. PD-L1 and VISTA). This study involved the implantation of cancer cells (5x105 4T1 cells) orthotopically in the 4th inguinal fat pad of female BALB/c mice. Tumors are typically palpable 8-9 days post-injection and they reach their endpoint 20 days post-implantation. Mice will be euthanized, and their tissues (spleen and tumor) harvested for cell isolation. The proportion of CECs, T cells, and antigen-presenting cells are quantified, and the CECs are characterized for the expression of PDL-1, PDL-2, arginase-I/II, ROS, TGF-β, and VISTA as potential immunomodulatory molecules. Furthermore, we will isolate CECs and T cells from the spleen of tumor-bearing mice according to our routine isolation protocols. Then we will culture isolated T cells in the presence and absence of CECs at different ratios following stimulation (anti-CD3/28). In conclusion, the proposed study on studying the role of CECs in breast cancer offers a comprehensive understanding of the complex interplay between immune cells and tumor cells, which has significant implications for women's health. By focusing on breast cancer metastasis, which disproportionately affects women, the study highlights the importance of gender-specific investigations in biomedical research to address the unique health concerns faced by women.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 227
Presenter: Alexa Thompson
Supervisor: Charlton, Carmen L
Title: Evaluating the effectiveness of a new call-out system for linking first-time prenatal HCV positive patients to care in Alberta
Authors: L.Alexa Thompson, Sabrina S. Plitt, Karen Doucette, Carla S. Coffin, Kristin B. Klein, Joan L. Robinson, Carmen L. Charlton

Theme: Pregnancy and developmental trajectories

Introduction Increased healthcare visits during pregnancy make the prenatal period an optimal time to test women for hepatitis C virus (HCV) and link women to care. Alberta currently offers universal prenatal HCV screening which we have previously shown increases new case findings two-fold. Here, we aim to assess the effectiveness of a new call-out notification system for linking first-time prenatal HCV positive women to care in Alberta. Methods On January 31, 2021, a new call-out notification system was implemented in the provincial public health laboratory (ProvLab) for first-time prenatal HCV positive patients. Before this period, ordering providers were responsible for linking prenatal HCV positive patients to care for follow-up liver enzyme testing, liver scans, and treatment, and ProvLab was not part of this referral process. With our new notification program, ProvLab virologists on-call now contact ordering providers to provide the prenatal HCV positive test result, discuss where the patient should be referred, and prompt the ordering provider to complete the referral. To evaluate the effectiveness of our new notification program, one-year cohorts were generated for first-time prenatal HCV positive women diagnosed prior to the call-out program (January 30, 2020-January 30, 2021) and during the new notification program (January 31, 2021-Janaury 31, 2022). The proportion of women being linked to care (i.e., receiving liver enzyme testing within one year of diagnosis) was calculated and compared between cohorts. For those linked to care, turnaround times were calculated between prenatal HCV diagnosis and liver enzyme test date. Associations between prenatal characteristics and both linkage to care and turnaround times were assessed using Firth's logistic regression and zero-inflated negative binomial regression, respectively. Results There were 32 first-time prenatal HCV positive patients diagnosed prior to the notification period and 17 in the notification period, of which 22 (68.8%) and 13 (76.5%) were linked to care, respectively (equating to a 7.7% increase, p=0.743). HCV/syphilis coinfected women were significantly less likely to be linked to care compared to those without coinfection (aOR 0.05 (0.01-0.96), while unstably housed individuals in the new notification period were more likely to be linked to care (aOR 38.9 (1.91-650.6). Median turnaround times increased from 26 to 43 days with the new notification program and was associated with women who have had multiple pregnancies (aIRR 16.2 (1.06-248.6). Conclusion More work is needed to improve linkage to care for prenatal HCV positive women in Alberta. HCV care should be prioritized concurrently in women with syphilis coinfection, and efforts should focus on programs that co-localize liver enzyme testing with prenatal and postpartum appointments, especially for women who already have children.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 228
Presenter: Ibrahim Khodabocus
Supervisor: Bourque, Stephane
Title: Fecal slurry-induced peritonitis results in hepatic mitochondrial dysfunction and oxidative stress in an acute murine model of sepsis
Authors: Ibrahim Khodabocus, Avery Noppers, Rohini Roy Roshimi, Si Ning Liu, Jad-Julian Rachid, Claudia Holody, Hélène Lemieux, Stephane Bourque

Theme: Pregnancy and developmental trajectories

Introduction: Sepsis is a life-threatening condition caused by a dysregulated host response to infection, which is associated with widespread mitochondrial dysfunction, metabolic perturbation, resulting in an outstanding 1.4 million deaths annually. Even after recovery, sepsis adversely affects normal growth and development, which can lead to lasting health cardiovascular complications throughout life. Here, we attempted to characterize the acute (over 24h) impact of fecal slurry-induced peritonitis (FIP) on mitochondrial function in the liver, to gain further insight into the impact of FIP on overall liver health. Methods: Approximately 120 adult C57BL/6 mice were purchased from Charles River (Saint-Constant, QC, Canada) and housed at the University of Alberta animal care facility under a 12h light/dark cycle and an ambient temperature setting of 23oC. Mice were allowed to acclimatize for a minimum period of 1 week, prior to being utilized for these experiments. All mice had ad libitum access to food and water throughout the duration of the study. FIP was induced in 10-14-week-old (equivalent to a late adolescent adult human) C57BL/6 male and female mice (n=6-10) by injecting fecal slurry (FS, 0.55 mg/g body weight) intraperitoneally, while controls received vehicle (CTL, 5% dextrose in water containing 10% glycerol). Analgesics (sustained-release buprenorphine, 0.5 mg/kg) was given for pain relief 4h post-FS/CTL injection. Fluids (Ringer's lactate, 15 mL/kg) and antibiotics (Imipenem, 25 mg/kg) was administered subcutaneously at 12h post-FS/CTL injection. At 4h, 12h, and 24h post-FS/CTL, mice were anesthetized with isoflurane (4% induction, 2.5% maintenance in pure O2), then euthanized by exsanguination and the subsequent excision of the heart. Fresh liver was harvested and homogenized to assess mitochondrial function, via high resolution respirometry (Oroboros O2K System). The remaining liver was flash frozen to assess hepatic oxidative stress. At the timepoint with the greatest perturbation in mitochondrial function, we looked at the concentration of 8-oxo-dG in hepatic genomic DNA to gain further insight into the level of dysregulation present within the liver. Results: We found a significant reduction in the NADH pathway, as expressed as O2 flux per mg of tissue, in male ($p=0.0466$) and female ($p=0.0024$) liver, 12h after insult. We also found a significant reduction in the N pathway, as expressed as flux control ratio, in male ($p=0.0306$) and female ($p=0.0005$) liver, 12h post-FS injection. We found no significant differences between CTL and FS liver samples at 4h or 24h after induction ($p>0.05$). We found a significant increase in 8-oxo-dG in female ($p=0.0113$), but not male ($p=0.3549$) genomic DNA, suggesting a sex-specific response to FIP-induced hepatic oxidative stress. Conclusion: Male and female mice present with mitochondrial dysfunction 12h after insult in an acute murine model of sepsis. Female mice present with increased DNA oxidative stress, while male mice do not, suggesting a sex-specific response to FIP. The long-term consequences of FIP-induced mitochondrial dysfunction and oxidative stress is still being investigated, but this work may identify the mitochondria as a target for intervention, in the acute treatment of FIP.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 229
Presenter: Avery Noppers
Supervisor: Bourque, Stephane
Title: Fecal slurry-induced peritonitis results in perturbed antioxidant expression in the liver, spleen, and heart at 4 hours after sepsis induction.
Authors: Avery Noppers, Ibrahim Khodabocus, Rohini Roy Roshimi, Si Ning Liu, Jad-Julian Rachid, Claudia Holody, Hélène Lemieux, Stephane Bourque

Theme: Pregnancy and developmental trajectories

Introduction: Sepsis is a life-threatening condition caused by a dysregulated host response to infection, which is associated with widespread mitochondrial dysfunction, metabolic perturbations, resulting in an outstanding 1.4 million deaths annually. Even with recovery, sepsis adversely affects normal growth and development, which can lead to lasting health cardiovascular complications throughout life. Here, we attempted to explore the immediate impact of fecal slurry-induced peritonitis (FIP) on antioxidant expression in metabolically important organs such as liver, spleen, and heart to gain further insight as to the impact of FIP on antioxidant activity. Methods: FIP was induced in 10-14-week-old C57BL/6 male and female mice (n=6-10) by injecting fecal slurry (FS, 0.55 mg/g body weight) intraperitoneally, while controls received vehicle (CTL, 5% dextrose in water containing 10% glycerol). Analgesics (sustained-release buprenorphine, 0.5 mg/kg) was given for pain relief 4h post-FS/CTL injection. Fluids (Ringer's lactate, 15 mL/kg) and antibiotics (Imipenem, 25 mg/kg) was administered subcutaneously at 12h post-FS/CTL injection. At 4h, 12h, and 24h post-FS/CTL, mice were anesthetized with isoflurane (4% induction, 2.5% maintenance in pure O2), then euthanized by exsanguination and the subsequent excision of the heart. Mice liver, spleen, and heart (solely both ventricles) were collected for RT-qPCR experiments by immediately snap-freezing in liquid nitrogen, to be stored at -80oC until further processing ensued. We chose to look at the expression of catalase, glutathione peroxidase 2 (GPX2), glutathione peroxidase 4 (GPX4), superoxide dismutase 1 (SOD1), and superoxide dismutase 2 (SOD2) in the three tissue types 4h-post-FS induction. Results: We found a significant reduction in the expression of catalase in male ($p=0.0298$) and female ($p=0.0019$) liver as well as male ($p=0.0006$) and female ($p=0.0387$) spleen, but we found a significant increase in female heart ($p=0.0059$) samples. We found a significant reduction in the expression of GPX2 in male ($p=0.0097$) and female ($p<0.0001$) liver as well as male ($p=0.0003$) and female ($p=0.0003$) spleen, but we found no significant differences in heart ($p>0.05$) samples. We found a significant reduction in the expression of GPX4 in male ($p=0.0443$) and female ($p=0.0002$) liver as well as female ($p=0.0042$) spleen, but no significant differences in heart ($p>0.05$) samples. We found a significant reduction in the expression of SOD1 in male ($p=0.0092$) and female ($p<0.0001$) liver as well as female ($p=0.0396$) spleen, but we found no significant differences in heart ($p>0.05$) samples. We found a significant reduction in the expression of SOD2 in male ($p<0.0001$) and female ($p=0.0001$) liver as well as male ($p<0.0001$) and female ($p<0.0001$) spleen, but we found no significant differences in heart ($p>0.05$) samples. Conclusion: FIP results in multiorgan perturbation in antioxidant expression at 4h post-FS induction, which may help explain the lasting health cardiovascular complications that remain in patients who recover from sepsis, later in life.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 230
Presenter: Md Nur Ahad Shah
Supervisor: Yokota, Toshifumi
Title: Enhancing Muscle Function and Cardioprotection via DG9-PMO-mediated Exon 44 Skipping: Improved Cellular Uptake and Nuclear Localization in a DMD Humanized Mouse Model
Authors: Md Nur Ahad Shah, Hong Moulton, Toshifumi Yokota

Theme: Children's health and well-being

Introduction: Duchenne muscular dystrophy (DMD) is one of the most common lethal genetic disorders caused by mutations in the DMD gene. This gene, consisting of 79 exons, encodes the protein Dystrophin that supports the muscle membrane. Out-of-frame mutations in this gene lead to the loss of dystrophin protein which predisposes muscle fibres to damage. While treatments are available to slow down the progression of skeletal muscle and respiration-related phenotype, treatments for DMD-associated cardiac complications are significantly lagging. Current treatment options for DMD-associated cardiomyopathy are limited to the use of symptomatic treatments like beta-blockers and ACE inhibitors which make certain aspects of the disease more manageable; however, they do not directly address the underlying cause of the disease. Exon skipping is a promising therapeutic technique that employs DNA-like molecules called phosphorodiamidate morpholino oligomer (PMOs) to skip over the frame-disrupting part of the DMD gene and restore the reading frame. This results in the production of truncated but functional dystrophin. Despite 4 different PMOs currently being available for DMD treatment, none can induce exon 44 skipping. Furthermore, these approved PMOs have almost no efficacy in the heart making them ineffective against DMD-related cardiomyopathy which is currently the primary cause of DMD-related mortality. Hence, in this study, we have employed a cell-penetrating peptide we recently developed called DG9 and conjugated it to an exon 44 skipping PMO that is effective in both the skeletal and cardiac muscles. Methods: We employed various in silico and in vitro analyses to identify a promising PMO that can be used for skipping DMD exon 44. This PMO was then conjugated DG9 for in vivo analysis. We evaluated its efficacy in a humanized DMD mouse model that carries the human DMD gene sequence with an out-of-frame exon 45 deletion. We conducted an extensive pipeline of functional and molecular studies that includes grip strength and endurance tests, western blot, RT-PCR, tissue histology, immunohistochemistry, and serum biomarker analysis to determine the in vivo efficacy of our peptide-conjugated PMO. Immunocytochemistry experiments were further conducted to elucidate the uptake mechanism of this novel peptide in different types of muscle cells. Results: Molecular analysis showed that systemic treatment with DG9-PMO restored over 15% and 40% dystrophin compared to healthy control mice in skeletal and cardiac muscles, respectively. Immunohistochemistry revealed reduced tissue inflammation in the tibialis anterior muscles and an increase in the dystrophin-positive fibers. The treatment was able to provide significant cardio-protection against β-isoproterenol-induced cardiac damage. Serum biomarkers and tissue histology showed no observable toxic effects. Finally, our immunocytochemistry analysis showed that DG9-conjugation significantly increases the cellular uptake and nuclear localization of PMOs in muscle cells. Conclusion: We identified a promising PMO that resulted in improved muscle function and body-wide dystrophin production. This study lays the foundation for a promising peptide-conjugated PMO to advance into clinical trials.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 231
Presenter: Solmaz Ghajar
Supervisor: Dinu, Irina
Title: COVID-19 during pregnancy alters umbilical cord blood cells gene expression
Authors: Ghajar, Solmaz Hajizadeh, Nastaran Khademioureh, Sara Nezarat, Fatemeh Pyne, Saumyadipta Dinu, Irina

Theme: Pregnancy and developmental trajectories

Introduction:The COVID-19 pandemic has affected people of all ages, including pediatric hospitalizations. Despite the rarity of virus transfer from mother to fetus, COVID-19-induces maternal systemic inflammation during pregnancy, together with inflammatory alterations in the placenta, might cause immunological dysregulation and differential gene expression in the fetus that may have long-term effects in offspring. Genomic studies of tissues and cells have emerged as a key technique for outlining these pathways. In this study, the effects of maternal COVID-19 on the molecular signaling pathways of stem cells were examined using 457 and 5219 gene sets. Methods: We employed a gene expression dataset that was readily available in the Gene Expression Omnibus database (GEO accession number: GSE195938), which included the gene expression profiles of cord blood cells from 8 cases (pregnant women who had been exposed to COVID-19) and 8 controls (who had not been exposed to COVID-19). The Linear Combination Test (LCT) was used to compare cases and controls by taking into account 457 gene sets (representing the gene signatures of human embryonic stem cells) and 5219 gene sets (representing the gene signatures of immune cells). Additionally, GATA2, GATA2-AS1, GATA3, and GATA3-AS1 (genes that may be involved in cancer) were subjected to uni-variate analysis. Results and conclusion: Six gene sets (contributing to cells' epithelial-mesenchymal transition) of 457 and seven gene sets (contributing to innate immune responses to vaccination) of 5219 gene sets were differently expressed when cases and controls were compared (p and q-value 0.001). Finding the compromised molecular signaling pathways during maternal COVID-19 can advance understanding of the condition, aid in drug discovery, and lessen the long-term toll of disease on unborn children.

This research has been funded by the Stollery Children’s Hospital Foundation and the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 233
Presenter: Joseph Kirk
Supervisor: Lebeuf, Simone
Title: Medical Student Distress and Communication Challenges with Adolescent Patients
Authors: Joseph Kirk, Simone Lebeuf, Marghalara Rashid, Karen Forbes

Theme: Children's health and well-being

Introduction: Clinical clerkship provides opportunities for undergraduate medical students to put their classroom learning into practice with rotations in core medical disciplines, including pediatrics. However, the transition from classroom-based learning to clinical practice can bring challenges particularly around communication with patients. Encounters with adolescent patients and their families can be especially hard to navigate. Balancing professional obligations of confidentiality with family-centered care can also be difficult. In addition, many topics within Adolescent health can be challenging to discuss, including sexually transmitted infections, substance use, contraception, sexuality, gender identity and adolescent pregnancy. The combination of transitioning to clinical rotations and the added complexity of the adolescent interview can therefore be potentially distressing to learners. In order to further understand this experience, we aim to answer three key questions: what are students' lived experiences with communicating with adolescent patients during their pediatric rotation? What aspects of communication with adolescents and their families do undergraduate students find challenging or distressing? And are there potential areas for improving medical student confidence within the undergraduate medical education curriculum? Methods: A qualitative research approach using hermeneutic phenomenology will be used to focus on the shared lived experience of medical students and the primary researcher. Within this phenomenological analysis a constructivism theoretical paradigm will further guide the research to help understand multiple social constructions of knowledge. In order to achieve implement this design, purposeful sampling of information rich participants was sought by selecting from University of Alberta medical students who have completed their pediatric clerkship. Recruitment is completely voluntary. Participants who agree to participate undergo individual semi-structured interviews (30-60min each). Interviews are then transcribed and reviewed for thematic identification. Rigor was further increased through memoing, peer debriefing, and member checking before, during, and after the interview process. Results/Conclusion: Initial thematic analysis has just begun, and at this time several transcripts have been collected and initial themes are being identified, however conclusions have not yet been identified. Expected outcomes based on the unique topics included in an adolescent interview and prior research reported poor integration of sexual history discussion and mood questioning, we anticipate that this evaluation will likely identify several topics of the adolescent interview that are particularly distressing to medical learners, which subsequently leads to lower rates of integration into regular interviews. The identification of areas which increased distress and the opportunity to discuss these areas will therefore inform future intentions to help ease these discussions and improve comfort by medical students at the University of Alberta with adolescent histories.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 235
Presenter: Chelsea Morin
Supervisor: Schmolzer, Georg M
Title: Assessing the human factors involved in chest compression with superimposed sustained inflation during neonatal and pediatric resuscitation: a randomized crossover study
Authors: Chelsea MD Morin MD, Brenda HY Law MD, MSc, Jonathan Duff MD, MEd, Georg M Schmölzer MD, PhD

Theme: Children's health and well-being

Introduction Cardiopulmonary resuscitation (CPR) is performed in about 1.1% of all neonatal intensive care unit (NICU) admissions. Current neonatal resuscitation guidelines recommend three chest compressions (CC) to every one ventilation (3:1 C:V) and pediatric resuscitation guidelines recommend continuous CC with asynchronous ventilations (CCaV). A newer technique for CPR, called chest compression with sustained inflation (CC+SI) has resulted in faster time to return of spontaneous circulation (ROSC) and increased chances of ROSC in neonatal and pediatric animal studies and neonatal human studies. A high-pressure sustained inflation is provided (20-30 seconds on, one second off) with simultaneous continuous CC, providing passive ventilation through compression and release of the chest. One barrier to implementing this resuscitation technique is difficulty studying the human factors given the rarity and diversity of CPR events in neonatology. Methods We aimed to use standardized team-based simulations to 1) evaluate physical, cognitive, and team-based human factors of CC+SI in neonatal resuscitation teams as compared to standard 3:1 C:V and CCaV, 2) uncover potential barriers for implementing CC+SI within the neonatal clinic environment and 3) compare human factors challenges of a novel CPR technique. We ran a randomized cross-over simulation study within two level three NICUs. Twenty two-person teams of neonatal-trained healthcare professionals were randomly assigned first to one of two simulations and one of two CPR methods (i.e., CC+SI or their choice of CCaV/3:1 C:V) and then to the other simulation and other CPR method. Following the simulations, they were each asked to fill out a questionnaire, including the NASA-TLX (assessing mental, physical, and temporal demand; performance; effort; and frustration), and participate in a debrief session. Results Forty healthcare professionals including 18 respiratory therapists, 13 nurses, four neonatal nurse practitioners, three neonatal fellows, and two neonatologists participated in the study. There was no difference in average overall TLX raw (average) scores (p=0.88) or sum of dimension scores (p=0.89), independent of order performed, for CC+SI, 3:1 C:V, and CCaV. Paired TLX raw scores were significantly lower with CC+SI compared to CCaV when CC+SI was performed first (p=0.002) and when CCaV was performed first (p=0.028). There was no difference between paired TLX raw scores with CC+SI compared to 3:1 C:V when CC+SI was performed first (p=0.43) or when 3:1 C:V was performed first (p=0.12). Conclusions It is no more difficult to perform CC+SI than 3:1 C:V on a resuscitation team in the NICU, but is perhaps less overall difficult to perform CC+SI than CCaV. Common feedback provided by healthcare professionals included feeling like they had more time for decision-making with CC+SI because they did not need to coordinate or count ventilations. Some healthcare professionals commented that keeping track of 30-second inflations was difficult.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 236
Presenter: Alina Kharel
Supervisor: Pituskin, Edith
Title: Pediatric nurses: grief experiences and formal support strategies
Authors: Alina Kharel Dr. Edith Pituskin Dr. Gillian Lemermayer Karina Black

Theme: Children's health and well-being

Introduction: It is a natural human reaction to experience grief as pediatric nurses while working with children experiencing pain, illness, suffering, and death. However, if the nurses do not recognize the grief symptoms, accumulated grieving experiences can lead to moral distress, higher secondary traumatic stress, and decreased compassion satisfaction. These issues have a direct negative influence on nurses' personal and professional lives, as well as a potentially detrimental impact on pediatric patient care, families, and the healthcare system as a whole. It is essential for pediatric nurses to have formal support systems in place to help them recognize grieving symptoms and learn to manage their grief effectively. Although variable strategies exist in some Canadian healthcare institutions, their effectiveness remains low as evidenced by nursing shortage, low retention rates, and high job dissatisfaction among pediatric nurses. Objective: The objective of this study is to synthesize the evidence on what constitutes an effective formal support program for grief experienced by pediatric nurses. Method: An Integrative review is underway reviewing and analyzing literature relevant to Pediatric nurses experiencing grief, burnout, compassion fatigue, and secondary traumatic stress. The review was conducted using bibliographic databases like CINAHL, MEDLINE, SCOPUS, and Google Scholar search engines. English-language scholarly articles published in the last ten years were included in the study. The Covidence software program will be used to remove duplicates, screen articles, and extract data. Data evaluation and analysis to follow. Anticipated results: This project is expected to provide a framework for the development and/or refinement of accessible, acceptable, and effective formal support programs for pediatric nurses at risk or experiencing grief. It is anticipated that improvement in formal support will lower moral distress, improve job satisfaction, and ultimately enhance the quality of care provided to pediatric patients and families. Keywords: Pediatric nurses, moral distress, Coping strategies, Intervention

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 237
Presenter: Bishoi Aziz
Supervisor: Wine, Eytan
Title: Using Machine Learning Classification to Differentiate Ulcerative Colitis from Other Colitis Lesions in Pediatric Colonoscopy
Authors: Bishoi Aziz, Hien Huynh, Jacob Jaremko, Eytan Wine

Theme: Children's health and well-being

Introduction Ulcerative colitis (UC) is an autoimmune disease that affects the colon. ITs incidence in the paediatric population has shown a consistent rise over the past decade in Canada. The gold standard diagnostic tool for UC is colonoscopy. Colonoscopy is operator dependent. This may lead to inaccurate management decisions. In this study, we aim to test whether machine learning (ML) can identify UC lesions in paediatric colonoscopy images. Methods Data: we used 1549 colonoscopy images of 202 pediatric patients who had baseline colonoscopy procedures at Stollery Hospital, University of Alberta (UofA), between 2014 and 2019. Data were categorized as either UC or non-UC. The ground truth diagnoses were confirmed by expert paediatric gastroenterologists and pathological examination of specimens taken during the procedure. Exclusions: 1) images of normal colon segments from patients with pathological diagnosis. Only images of pathological segments were kept. Images from completely normal colonoscopies were included in the non-UC group. 2) non-readable images due to complete obstruction of the colon wall by blood, stool, endoscopy water shed. Analysis: We used Python 3.9.13 through Spyder 5.3.3. We performed binary classification using the pre-trained ResNet50 convolutional neural network (CNN). Results Our cohort included UC patients (n=49), and non-UC patients (n-153). Non-UC patients were formed mainly of CD and normal patients. The best model experiment yielded an AUC of 99.4% in the training dataset. However, the model implementation with the best results yielded an AUC of 57.3% in the testing dataset (table). This indicates a state overfitting. Overfitting happens when a model performs very well on the training dataset, but shows a poor performance when tested on unseen data. That happens when the model parameters can't be generalized over the general population. Conclusion This study shows an early implementation of a convolutional neural network model to discriminate between UC and the different colitis lesions in paediatric colonoscopy. At this stage, it is quite early to comment on CNN performance in predicting that disease, however, this shows good potential. Our results show the well-known problem of overfitting that CNNs are prone to with limited datasets. To unleash the full potential of CNN in that question, we need to perform extensive experimentation using a powerful GPU processor to be able to handle the computations over a large dataset. This will ensure the model is trained on a wide variety of colonoscopy images. That in return will make it harder for the model to overfit yielding a generalizable model.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 238
Presenter: Meng Yuan
Supervisor: Graf, Daniel
Title: The epigenetic regulator ANKRD11 controls tooth development
Authors: Meng Yuan, Daniela Roth, Katherine Souter, Maria Alexiou, Pranidhi Baddam, Anastassia Voronova, Daniel Graf

Theme: Children's health and well-being

Introduction: Tooth development involves reciprocal epithelial-mesenchymal signaling. The Ankyrin repeat domain-containing protein 11 gene (ANKRD11) interacts with histone deacetylases and thus participates in the epigenetic control of cell differentiation. However, the requirement for epigenetic control of tooth shape, mineralization, root formation, accessory teeth or succession teeth is still poorly understood. Macrodontia of upper incisors, fused teeth, missing teeth, root duplications, and mineral anomalies are frequent in individuals with KBG syndrome, which carry variants in ANKRD11. We hypothesize that ANKRD11 is required both in dental epithelium and mesenchyme to ensure normal tooth development. Methods: Epithelium (Ankrd11oeko) or neural crest (Ankrd11ncko) -specific Ankrd11 mutant mice were obtained by mating Ankrd11flx with K14-Cre or Wnt1-Cre2 mice. Embryos/postnatal mice were collected, fixed and then processed for histology /immunofluorescence. E15.5 Ankrd11ncko tooth buds were transplanted under the kidney capsule of adult recipient mice. MicroCT analysis was performed using a Milabs UHT-CT system. Antibodies used were Bmp2, Bmp7, Sp7, Non-phosphorylated beta catenin, pSmad1/5/8, Dsp, Keratin 14, Keratin 5, and Ankrd11. Histological analysis was done using hematoxylin & eosin and Picro-Sirius Red. Results: Ankrd11 expression is observed in both dental epithelium and mesenchyme. Ankrd11oeko mice are born but initially fail to thrive. They show rapid cusp attrition suggestive of reduced enamel quality. Quantification of mineralized tissue verifies that. Epithelial-specific markers show inappropriate gene expression with the various epithelial layers of the enamel organ. Ankrd11ncko teeth show abnormal pulp and odontoblast differentiation. Maxillary and mandibular 2nd molars were larger than the 1st molars. Conclusion: Loss of Ankrd11 illustrates the importance of epigenetic programming during most aspects of tooth development. Together, both mouse models recapitulate many of the reported tooth anomalies in KBG patients. Future studies will focus on identification of molecular targets of Ankrd11.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 239
Presenter: Caroline Jabagun
Supervisor: Punjani, Neelam
Title: Exploration to understand cultural barriers affecting parent's involvement in the Neonatal Intensive Care Unit.
Authors: Researcher: Caroline Jabagun Academic Advisor: Neelam Punjani

Theme: Children's health and well-being

Introduction The positive impact of families' presence and support in the Neonatal intensive Care Unit (NICU) has been a major source of strength for preemie babies. A gentle touch, a whisper, a familiar tune from a parent seems to somehow produce a quiet sigh, a sign of comfort or the occasional quick grin from a preemie. Consequently, the gap occupied by the incubator disappears and nothing else matters in that moment. Past studies have shown that skin-to-skin contact can dramatically yield effective results on babies' health in comparison to increasing settings on a ventilator. Hospitals, clinics and other healthcare facilities encourage parent's participation in the care of their babies however, in these situations, parents are often confused, oblivious or misunderstood. Ultimately, when parents and families in general don't feel heard, it negatively influences the baby's stay which eventually delays healing, growth and overall health. Research Question: How does cultural barriers negatively impacts preemies' length and quality of stay in the NICU? Purpose of study: This research study will aim to explore NICU's parents' experiences in the participation of care of their babies and its impact on the prognosis. Furthermore, understanding their perspectives would encourage incorporating strategies for a better NICU stay. This will not only improve care provided by staff but will also create an effective two-way communication between families and healthcare team. Methods: This study will utilize qualitative method using ethnography approach. NICU parents will be recruited, and data will be collected through observations and individual interview using semi-structure interview guide. Through interviews, we will understand parent's feelings about NICU care and how they, as parents fit into it. Results: The use of different learning methods to explain prognosis has been incorporated in most hospitals, however, families would be keener to participating in care by creating new practices and policies for better understanding diagnosis and medical interventions. An ultimate outcome would be continuous expressions of parents and families advocating for their child in the NICU. Conclusion: The wide range of races, religions and cultures in Canada makes the society known as a multicultural country. So therefore, it's imperative that we, as healthcare professional starts understanding cultural barriers and gaps in healthcare delivery. This will not only advance our practices but will improve standard of care. Subsequently, it'll help target misconceptions as well as cultural sensitivity and awareness. By doing this, parents will feel seen and heard and therefore actively participate in their babies care such as rounds and other medical appointments.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 240
Presenter: Thi Nhu Nguyen Nguyen
Supervisor: Lou, Edmond HM
Title: Validation of a newly developed wireless handheld 3D ultrasound system to monitor children with adolescent idiopathic scoliosis
Authors: Thi N. N. Nguyen, Lawrence H. Le, Eric C. Parent, Kyle Stampe, Sarah Southon, Edmond H. M. Lou

Theme: Children's health and well-being

Introduction Adolescent idiopathic scoliosis (AIS) is a complex three-dimensional (3D) deformity of the spine without an identifiable cause. Approximately 2-3% of adolescents have AIS and females usually have more severe deformity. Currently, Cobb angle (CA), axial vertebral rotation (AVR), kyphotic and lordotic angles (KA and LA) can be measured from standing posteroanterior and lateral radiographs to diagnose and make treatment decisions. To reduce the radiation exposure associated with repeated radiographs taken over the lifespan of the patient, 3D ultrasound (US) imaging method has been developed. Studies have demonstrated that specific 3D US consoles can be used to scan children with AIS and provide reliable curvature measurements for CA, AVR and KA. However, those specific systems require a significant amount of space to operate and are lack of portability. This pilot study aimed to validate a newly developed wireless handheld 3D US system for scoliosis application. Methods Ethics approval was granted. Twenty participants (19 F and 1 M, age of 13.4±2.4 years) were recruited. The inclusion criteria were participants (1) diagnosed with AIS, (2) aged 10-18 years old, (3) with Cobb angle ≤ 55°, (4) required to have standing out-of-brace radiographs on the study day, and (5) with no prior surgeries. All participants and their guardians signed the assents and parental consent forms prior to participation. Two ultrasound scans by 1) an integrated 3D portable US and 2) the validated Sonix system were performed by the same operator. Four parameters including CA, AVR, T1-T12 KA and L1-L5 LA were measured twice from US images obtained from both US systems, and once from the corresponding spinal radiographs by a trained rater. The reliability and validity of the portable US were evaluated using the inter-method of intraclass correlation coefficient (ICC[2,1]), the mean absolute difference and standard deviation (MAD±SD), and Bland-Altman plots showing the bias and limit of agreement, of those 4 parameters against the measurements from the Sonix system and radiography. Results A total of 36 curves with an average radiographic Cobb angle of 29.4°±9.0° were identified and measured manually. The average Cobb angle from the portable US and Sonix system were 30.8°±8.8° and 30.2°±9.2°, respectively. The ICCs[2,1] of the inter-method of the 4 parameters showed excellent reliability with the values ≥ 0.87. The Bland-Altman analysis also showed good agreement between the two US systems with maximum bias of 2.9° for all parameters. The mean absolute differences of CA, AVR, KA and LA for (portable US vs Sonix, portable US vs radiography) were (1.4°±0.9°, 1.9°±1.2°), (3.3°±2.7°, 3.7°±2.8°), (3.0°±2.2°, 7.2°±4.7°) and (1.7°±1.4°, 15.9°±8.4°), respectively. A large discrepancy was found on the lordotic angle as the US was not able to provide a good morphological shape of L5 compared to radiography. Conclusion The developed wireless handheld 3D US system showed good reliability and accuracy on CA, AVR and KA measurements. Further study is needed to understand how to measure the lordotic angle accurately prior to promoting this system to other centers.

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 241
Presenter: Xiaoying Wu
Supervisor: Vine, Donna
Title: Early Atherosclerotic Burden and Diastolic Impairment in High-Risk Young Women with and without Polycystic Ovary Syndrome
Authors: Xiaoying Wu, Mich Wilke, Jesse Batara, Mahua Ghosh, Paolo Raggi, Harald Becher, Donna Vine

Theme: Lifelong women's health

Introduction: Polycystic ovary syndrome (PCOS) is the most reproductive-endocrine-metabolic disorder that affects around 15% of women. The diagnostic criteria of PCOS includes hyperandrogenism, polycystic ovaries and ovarian dysfunction. Previously, we've identified high-risk women with and without PCOS had atherogenic lipid profile. However, limited studies were looking at atherosclerotic burden together with cardiac function in these young women. The aim of this study was to assess atherogenic dyslipidemia and early atherosclerotic CVD in women with and without PCOS. Methods: Overweight-obese (BMI >25kg/m2) females aged 18-45 years with and without PCOS matched for age and BMI. Healthy-weight controls were recruited as a reference group. ACVD indices: carotid intimal-medial thickness (cIMT), presence of carotid plaque and plaque height (CPH), and cardiac function were determined by 2D and 3D-echocardiography. Results: Fasting and non-fasting lipids were elevated in PCOS and BMI-matched controls; in particular, PCOS showed 45-50% higher triglycerides and 27% higher fasting remnant-C compared to BMI-matched controls. cIMT was significantly higher by 17-21% in PCOS and BMI-matched controls; CPH was 35% higher in PCOS group compared to BMI-matched controls. All cardiac function indices were comparable between PCOS and BMI-matched controls; however, PCOS showed exaggerated trend of diastolic dysfunction measured by lower E/A ratio and prolonged isovolumetric relaxation time. In step-wise linear regression analyses age, diastolic blood pressure and HOMA-IR were associated with cIMT; whereas age and apoB were associated with CPH. Conclusion: Our results showed that high-risk women with and without PCOS had increased ACVD, and those with PCOS had exacerbated ACVD, diastolic function and atherogenic dyslipidemia. Our results highlight early subclinical screening of ACVD and cardiac function, in particular cIMT, carotid plaque height and cardiac LV morphology, are important assessments to re-stratify ACVD risk in young high-risk females with and without PCOS.

This research has been funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 242
Presenter: Sabrin Bashar
Supervisor: Kozyrskyj, Anita
Title: The impact of early life hospital length-of-stay on infant gut microbiota composition and risk of food sensitization
Authors: Sabrin Bashar, Hein Min Tun, Piushkumar Mandhane, Theo Moraes, Elinor Simons, Stuart Turvey, Padmaja Subbarao, James Scott, Anita Kozyrskyj

Theme: Children's health and well-being

Introduction: Infants delivered by cesarean section normally stay longer in hospital after birth and are treated with antibiotics, both of which promote hospital-acquired infection with Enterococcus spp., and enterobacterial species of the Proteobacteria. However, the effects of extended exposure to a hospital environment following any delivery type on infant gut microbial development and subsequent health outcomes remain poorly understood. Objective: The purpose of the study was to examine the relationship between prolonged hospitalization following any method of delivery, infant gut microbial composition at 3 and 12 months of age, and its impact on food sensitivity at 1 and 3 years of age. Methods: This was a study of 1313 infants in the Canadian Healthy Infant Longitudinal Development (CHILD) Cohort Study, excluding home births. Infant gut microbiota was characterized by Illumina 16S rRNA sequencing of fecal samples collected at 3 and 12 months. The gut microbial profile of infants hospitalized for >1 day in vaginal delivery (VD) and ≥3 days in cesarean delivery (CD) were compared to profiles of infants with shorter-length hospitalization. Associations between hospital length of stay (LOS) and gut microbiota composition as well as food sensitization were determined by logistic regression. Finally, mediation analyses were conducted to test whether early-life hospital LOS associate with infant food sensitization at 1 and 3 years of age through 3-month and 12-month microbiota as intermediate variables. Results: At 3 months, commensal bacteria Bacteroides (p=0.03) were depleted in VD infants and Bifidobacterium (p=0.025) in CD infants who were prolonged hospitalized. Already depleted in CD [median abundance=0.0008, IQR (0.0003 - 0.0056)] versus VD [median abundance=0.301, IQR (0.001-0.597)] at 3 months (p=<0.01), prolonged hospitalization following CD further lowered the abundance of Bacteroides (p=<0.01) at 12 months. In the absence of maternal intrapartum antibiotic (IAP) exposure, VD infants with a longer hospital stay were more likely to have a higher abundance of Enterococcus in their gut both at 3 months (aOR 1.41, 95% CI 1.04-1.93, p=0.02) and 12 months (aOR 1.45, 95% CI 1.05-2.01, p=0.03) of age. The same group of infants with longer hospital stays also had higher abundances of Citrobacter (aOR 1.42, 95% CI 1.04-1.94, p=0.02) and lower abundances of Bacteroides (aOR 0.74, 95% CI 0.54-1.01, p=0.05) at 3 months. In multiple logistic regression models, no association was observed between prolonged hospitalization and food sensitization regardless of birth modes and IAP. Interestingly, we observed a significant mediating role of a higher abundance of Enterococcus species in early life and a lower abundance of commensal bacterial family Bacteroidaceae at later infancy in the pathway of LOS and food sensitization at 1 year (mean difference 0.01, bootstrap 95% CI 0.0004-0.026) in VD-no IAP infants; no associations were observed in CD infants. Conclusion: Prolonged infant exposure to the hospital microbial environment after birth can lead to over-representation of pathogenic bacteria, as well as the depletion of several beneficial microbiota which ultimately cause food sensitization in later life, particularly in VD-no IAP infants.

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 248
Presenter: Jacquelyn Paquet
Supervisor: Brett-MacLean, Pamela
Title: The role of COVID-19 and rural/urban status on youth psychiatric presentation in Alberta: Trends in child and adolescent mental health
Authors: Paquet, J; Hibbard, K; Greenshaw, A; Brett-MacLean, P

Theme: Children's health and well-being

Introduction: The onset of the COVID 19 pandemic led to urgently initiated lockdown interventions in March 2020 with widespread impacts on psychiatric and physical illness across the age spectrum. Increasing social inequities among vulnerable populations, particularly children and adolescents, was further exacerbated by the pandemic and its consequences. This study explored trends in presentation of mental illness among children and adolescents in Alberta by rural/urban location. Methods: We accessed all medical encounters for Albertans aged 0-17 utilizing ICD 9 and 10 billing codes for psychiatric disorders from 2017 to 2021 including emergency (N=42,176), outpatient (N=322,840), inpatient (N=15,047) settings. Billing codes were divided into categories of anxiety, mood, eating, substance use, and self-harm. Data included biological sex, age, and geographic location. Two age groupings 6-11 and 12-17 were analyzed. With respect to rural/urban status - rural was classified as 1) large rural area, 2) small rural area, 3) Northern; and urban was classified as 1) metropolitan, 2) metropolitan suburb, 3) urban, 4) urban suburb. We completed pre (2017 to 2019) and COVID (2020 to 2021) comparisons. Univariate and regression analysis was performed. Results: After March 2020, elevated presentation of anxiety and mood disorders was the most common across all healthcare and geographic settings among youth aged 12 to 17. There were higher presentations for females across all settings for anxiety, mood, and eating disorders ($p = 0.00$). Presentation of anxiety disorders was more common in outpatient settings in urban regions (metropolitan ($p = 0.01$), metropolitan suburb ($p = 0.00$) and urban ($p = 0.03$)). In rural settings, psychiatric presentations at emergency departments ($p = 0.07$) were somewhat more common than outpatient or inpatient settings. Female eating disorders increased in outpatient ($p = 0.05$) and emergency contexts ($p = 0.00$) without geographic differences. For substance use disorders, rural cohorts were more commonly seen in outpatient (large rural, $p = 0.06$; small rural, $p = 0.03$; Northern, $p = 0.04$) and in the emergency settings (large rural, $p = 0.03$; small rural, $p = 0.00$; Northern, $p = 0.00$). Self-harm admissions decreased during COVID-19 with increased emergency department visits. Conclusion: An increase in psychiatric consultations in all settings was found. Anxiety disorders had the most notable increases especially among females during COVID, with increased outpatient and inpatient presentations. Different trends for rural compared to urban cohorts pre-COVID and during COVID, including increased substance related presentations in all three settings for rural cohorts and increased anxiety outpatient consultations and admissions for mood. This data highlights the need to investigate the differences with geography in care access, strategies to address the geographical differences and consider how the trend will compare post-COVID.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 250
Presenter: Shivani Solanki
Supervisor: Storey, Kate E
Title: Middle and high school student perspectives of smoking and vaping behaviours and well-being
Authors: Shivani Solanki, Genevieve Montemurro, Tricia Zakaria, Ryan Fahey, Kate Storey

Theme: Children's health and well-being

Introduction: Adolescence is a critical time when youth develop behaviours that are beneficial to their health, such as engaging in physical activity or practicing mental self-care. Alternatively, they can also develop risky behaviours, such as tobacco misuse. Due to the recent rise in the popularity of vaping among adolescents, there is a need for smoking prevention interventions that are designed specifically for young people. However, most programs have not engaged youth throughout implementation even though it is known that peer-led programs are more effective when they engage students as champions. Understanding youth perspectives by engaging youth directly is fundamental to understanding and addressing their smoking behaviours. Students Together Moving to Prevent Tobacco Use (STOMP) is a national smoking prevention and cessation program led by youth within their school communities. Youth who participate as STOMP student action team (SAT) members tailor intervention activities to address the needs of their school community. SAT students are leaders within their school and offer unique insight into STOMP implementation. Therefore, the purpose of this research is to understand youth perspectives and explore their perceptions of smoking behaviours and the perceived impact on well-being among SAT students within STOMP schools. Methods: This study is currently underway and is taking a qualitative approach guided by focused ethnography and will provide insight into the experiences of students participating in STOMP. Focus groups serve as the data generation strategy. SAT members from grades 7 to 12 from seven STOMP schools across Canada are being invited to participate in this research. Schools are located in rural and urban areas and have diverse student populations. Semi-structured focus groups are being conducted with 4 to 8 participants per group at each of the school sites. Focus groups are being transcribed and cleaned in Otter.ai and data analysis is underway using inductive thematic analysis and organized using NVivo 14. Results: Data generation was initiated in December 2022 and is ongoing. Focus groups have been conducted at five sites between December 2022 to June 2023 (n=35). Initial findings highlight students' awareness and application of harm and stigma reduction to help peers reduce their tobacco use. The presence of normalized smoking and vaping culture in some schools was a perceived barrier to successful smoking prevention and cessation efforts led by students, however, students shared a feeling of empowerment from promoting well-being in their school community that continues to drive their future health promotion actions. Complete data interpretation and results presentation will be concluded in early 2024. Final interpretations and findings will be shared with youth before dissemination, incorporating their insights and suggestions for knowledge sharing. Conclusions: The findings from this study are being used in practice by project partners to support the implementation of STOMP, within an ongoing process evaluation, and may be used to inform future interventions to support youth smoking prevention and cessation and well-being.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 252
Presenter: Jamie Leckie
Supervisor: Yokota, Toshifumi
Title: High prevalence of spinobulbar muscular atrophy in Cree, Saulteaux, and Métis Nations in the prairie provinces, and prospects for antisense oligonucleotide-mediated treatment
Authors: Jamie Leckie, Matthew Joel, Kristina Martens, Alexandra King, Malcolm King, Lawrence Korngut, Jason de Koning, Gerald Pfeffer, Kerri Schellenberg, Farhia Haque, Rika Maruyama, Toshifumi Yokota

Theme: Lifelong women's health

Introduction: Spinobulbar muscular atrophy (SBMA) is an X-linked recessive neuromuscular disease caused by a CAG repeat expansion in the androgen receptor (AR) gene, resulting in progressive and debilitating muscle weakness. Although it primarily affects males, female genetic carriers may also display mild symptoms. Anecdotal information suggested a high prevalence of SBMA amongst Indigenous populations in western Canada. This prompted research by our team into the disease's population prevalence and potential founder effect. No effective treatment currently exists, however, antisense oligonucleotide (ASO) therapies, which target pathogenic mRNA, are a promising approach for SBMA treatment. Methods: Prevalence rates were estimated by comparing individuals with confirmed SBMA from the Saskatchewan neuromuscular clinic with Statistics Canada population data. Patients diagnosed with SBMA were recruited from two neuromuscular clinics for haplotype analysis. Microsatellite sizing of 6 polymorphic microsatellites in strong linkage with the AR CAG repeat was conducted to identify disease haplotypes. ASO therapy, designed to target the pathogenic AR gene, was evaluated for efficacy through RT-PCR analysis in cell models. Results: The prevalence of SBMA for individuals from Saskatchewan of Indigenous descent was estimated to be 14.7 per 100,000 individuals, which is currently the highest reported prevalence of SBMA in the world. This is nearly double the second-highest prevalence in the world, and yet based on the pilot nature of our study, we are certain this prevalence is a substantial underestimate. The disease haplotype was determined for the 21 participants recruited. 13 participants of indigenous descent (mostly from Cree and Saulteaux First Nations) shared a unique disease haplotype. A separate haplotype was identified in two unrelated Métis participants. Preliminary ASO efficacy analysis revealed reduced toxic RNA products in SBMA cell models. Conclusion: A uniquely high prevalence of SBMA has been observed in the Indigenous communities in western Canada, which appears to be predominantly due to a founder effect. Given the genetic nature of SBMA and the absence of effective treatments, our research focuses on advancing ASO therapy to enhance the quality of life for both male and female SBMA-affected individuals.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 253
Presenter: Genevieve Coutu
Supervisor: Pin, Sophia
Title: A patient-driven heuristic analysis of educational videos for patients with endometrial cancer and obesity, and undergoing preoperative weight loss
Authors: Dr. G. Coutu, Dr. C. Aubrey, Dr. S. Chapelsky, Dr. S. Pin

Theme: Lifelong women's health

Introduction Endometrial cancer is the most common cancer of the female reproductive organs and has the strongest link to obesity of any other cancers in those who have a uterus. Improved education for those living with obesity and endometrial cancer, and a weight management approach can lead to improved cancer and long-term outcomes. We conducted a qualitative heuristic analysis on the usability of patient information videos in conjunction with a preoperative weight loss program to improve these resources for maximal patient benefit as determined by end-user evaluation. Methods Four educational video scripts were created and then evaluated within the study team to understand patient behaviours, needs, and expectations upfront. Final scripts were used to create video drafts, which were then subject to patient evaluation through heuristic analysis and usability testing. Three participants from the women's preoperative weight loss clinic prospective study participated in-person or telephone interviews from August-September 2023 conducted by a single observer. Participants were sent videos to be viewed 24 hours prior to a scheduled interview. Subsequently, four simulated scenarios with comprehension questions based on the video content tested usability. Data from these interviews were compiled into feedback which further iterated video content. Results One patient interview has been completed, with target of 3-5 to be completed by October 2023 Conclusion Patient feedback on the content within the information videos, and their ability to comprehend and apply this information, will result in more targeted and appropriate information. After final iterations, the videos will be produced and distributed to increase engagement and education in the local preoperative weight loss program, with the aim to be used as a patient educational tool nationally.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 254
Presenter: Kiana Chubey
Supervisor: Tremblay, Melissa
Title: A review of strengths-based social-emotional screening and assessment tools for high-school age youth
Authors: Kiana Chubey, Chloe Devereux and Melissa Tremblay

Theme: Children's health and well-being

Introduction: The development of social-emotional (S-E) skills (self-awareness, self-management, social-awareness, relationship skills and responsible decision-making) is important for the health and wellbeing of children and youth. Although adolescence represents an important period for the development of S-E skills, researchers and practitioners have largely focused on S-E development in the earlier years. This has resulted in a limited understanding of how to support and measure S-E development among adolescents, particularly for those facing structural marginalization, who may need unique skills to navigate various barriers in healthy development. To facilitate health and wellbeing, strengths-based approaches to assessment and screening can identify skills that can be bolstered to elevate youths' potential. Although a plethora of S-E screening and assessment tools exist, many of which are labeled as strengths-based, there is ambiguity regarding the ways in which such tools actually reflect strengths-based components. In addition, there is a lack of clarity regarding the extent to which S-E screening and assessment tools are standardized with structurally marginalized youth. Reviews can guide professionals in choosing tools by synthesizing information regarding the development, function and practical utility of tools. The objective of the current review was to review and evaluate the quality of strengths-based S-E tools for high-school age youth. Methods: Toward this objective, a literature review identified 80 S-E screening and assessment tools for high school-age youth. After screening out tools that did not mention being strengths-based, 15 tools remained. These 15 tools were systematically evaluated using a previously developed protocol to assess technical adequacy and usability. In addition, we reviewed the extent to which each tool enacted strength-based components, and each tool's relevance to structurally marginalized youth. Conclusion: Our findings provide practical information toward the selection and use of S-E tools for researchers and practitioners working with structurally marginalized young people.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 255
Presenter: Juliana Lasso Mendez
Supervisor: Hornberger, Lisa K
Title: VASCULAR DYSFUNCTION IN MATERNAL HEART DISEASE AND ITS CONTRIBUTION TO ADVERSE PREGNANCY OUTCOMES
Authors: Juliana Lasso-Mendez, Lisa K. Hornberger, Margie Davenport, Áine Brislane, Nicholas Cheung, Shauna Littlefair, Brendan Haughian, Jonathan Windram, Rshmi Khurana, Nazneem Wahab, Christy-Lynn Cooke, Meghan Riddell, Suzanne Chan.

Theme: Pregnancy and developmental trajectories

INTRODUCTON Four percent of pregnancies are complicated by congenital and acquired maternal heart disease (MHD). These pregnancies have a high risk of obstetric and fetal/neonatal complications, such as preeclampsia and preterm birth. These complications have been linked to poor cardiovascular adaptations including reduced cardiac output (CO) and abnormal uterine and umbilical artery pulsatility indexes in MHD. They have also been associated with underlying vascular dysfunction in healthy pregnancies without HD. Thus, both cardiac and vascular parameters could be contributing to these complications. Therefore, we hypothesize that poor cardiac adaptation and inadequate ventricular-arterial coupling (VAC), a measure of cardiovascular performance which comprises vascular health, contributes to maternal and fetal/neonatal complications in MHD. METHODS In this prospective cross-sectional case-control study, 42 pregnancies without and 42 with congenital/acquired MHD will be recruited to assess cardiovascular health in pregnancy. Case-controls will be matched by age, pre-pregnancy BMI and parity. Maternal and fetal cardiac assessments will be performed in the second trimester of pregnancy. Cardiac parameters including CO, ejection fraction myocardial strain and contractility as well as uterine-placental-fetal parameters will be obtained through maternal and fetal echocardiograms, respectively. VAC will be calculated as a measure of left ventricular volumes and blood pressure. Biomarkers of overall cardiovascular health such as serum glucose, lipid profile and C-reactive protein will also be assessed. In addition, physical activity information and health history will be gathered through questionnaires and will be used as statistical covariates in the analysis. Cardiac parameters such as cardiac output and ejection fraction and VAC will be compared between MHD and controls. Associations between reduced maternal cardiac output/function, poor VAC, and affected uterine-placental-fetal circulation, complications in pregnancy, and potentially fetal/neonatal health will be studied. Statistical analysis will be performed with SAS version 9.4. Sub-analysis for groups of congenital/acquired HD will be performed if sufficiently powered. ANTICIPATED RESULTS We have thus far recruited 33 control pregnancies and 31 MHD pregnancies. We hypothesize that MHD will be associated with reduced CO, poor VAC, and abnormal uterine and umbilical artery Doppler measures. CONCLUSIONS Reduced cardiac parameters and affected VAC in pregnancy complicated by MHD in the mid-trimester will contribute to obstetrical and fetal/neonatal complications in pregnancy. The results will help us determine contributing factors to obstetrical complications, fetal and neonatal health which will allow for optimized risk stratification as well as preconception counseling. It may also prompt evolution of preventative measures to aid women before/during their pregnancies which will benefit the mother and the child's health.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 256
Presenter: Juan Garcia Rivas
Supervisor: Clugston, Robin
Title: The development of the diaphragm and Congenital Diaphragmatic Hernia: Lessons learned from single cell transcriptomic analysis
Authors: Juan Felipe Garcia Rivas Robin Clugston

Theme: Pregnancy and developmental trajectories

Introduction: The diaphragm serves as the primary muscle of respiration in mammals, while also providing a barrier between the abdominal and thoracic cavities. Due to the importance of this muscle, abnormal diaphragm development can lead to lethal birth defects. Congenital Diaphragmatic Hernia (CDH) is a life-threatening condition with a high level of mortality that affects ~3 in 10,000 newborns. This condition is characterized by an incomplete formation of the diaphragm, leading to herniation of the abdominal organs into the thoracic cavity and lung hypoplasia. Since the etiology of this birth defect is not well understood, the goal of this experiment is to identify the different cell populations present in the developing diaphragm, and determine which populations express genes that are known to be involved in the pathogenesis of diaphragmatic hernias, to better understand the this condition. Methods: Fetuses from BALB/c dams were dissected at gestational day 13.5, and the pleuroperitoneal folds, the diaphragm precursor, were removed and dissociated in trypsin. The single cell suspension obtained was given to the High Content Analysis Core at the University of Alberta to prepare libraries for scRNA-seq, and then sequenced by Novogene. For the K-means analysis, Cloupe software was utilized, and for the UMAP analysis we used the Seurat package in R. Results: Clustering analysis revealed 18 different cell populations, and 10 unique cell types. The majority of the cells present in the developing diaphragm were non-muscular connective tissue. Gene expression analysis revealed that a wide array of genes associated with CDH, like Pbx1, Wt1, and Nr2f2 were enriched in the mesothelial and mesenchymal components of the developing diaphragm. Gene expression analysis also revealed that genes involved in the retinoic acid signaling cascade, like Rarb, Crabp2, and Aldh1a2 show the same pattern of expression as the CDH-associated genes, with highest expression of these genes seen in the mesenchymal component of the developing diaphragm. Conclusion: To our knowledge, this is the first time scRNA-seq technology has been utilized to investigate diaphragm development. Using our clustering analysis, we revealed cell populations that might be of critical importance for diaphragm development. Overall, our findings shed light into the complexity of diaphragmatic defects, and how multidisciplinary approaches are needed in order to better understand these syndromes.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 257
Presenter: Dominik Cesarz
Supervisor: Gamper, Armin
Title: Colon Organoids as Tool to Improve Pelvic Radiation Therapy
Authors: Dominik Cesarz, Dilip Malipatlolla, Kareena Nanda, Min-Hsuan Wu, Daise Matthew, Braden K. Chow, Kristi Baker, Geetha Menon, Armin M. Gamper

Theme: Lifelong women's health

Introduction: Pelvic radiation therapy (PRT) is essential for the treatment of a variety of cancers. Importantly, it is effective in curing gynecological cancers - specifically cervical cancer. Thanks to PRT the 5-year net survival for cervical cancer is now at 74% in Canada. Unfortunately, despite improved image guided delivery methods to minimize radiation exposure to neighbouring organs, radiation injury to the bladder and colon / rectum often is unavoidable during cervical cancer radiation treatment. In the case of the large intestine, radiation injury to the rectum or the sigmoid colon can manifest after weeks or years. Thousands of Canadian women live with bowel problems due to (successful) PRT. This makes prevention of PRT side effects a top priority for health care. As this project aims to discover drugs that protect from colorectal radiation damage by modulating the biological response, the project is part of an initiative to greatly improve the quality of life of many cancer survivors, especially cervical cancer survivors, thereby contributing to the improvement of lifelong women's health outcomes. Methods: This project attempts to improve pelvic radiation therapy by discovering drugs that protect against colorectal radiation associated side effects and damage. To meet these objectives, the project uses colon organoids, 3D cellular structures mimicking the colon and rectum, to determine the effect of varying doses of radiation on these organs and the subsequent modulation by drugs and other treatments. Imaging analysis of colon organoids and the repair capacity by stem cells is used to monitor these effects. We developed an organoid growth assay in the lab amenable for screening. Using high-content microscopy and imaging on days 0, 3, 6, and 10 after different doses of ionizing radiation we can longitudinally measure the radiation response. The responses are studied as a function of changes to the cellular status (e.g., antioxidants, hypoxia, hyperthermia) or inhibition of cell signaling pathways (DNA damage, apoptosis...) with drugs. Hundreds of individual colonoids are tracked over 10 days by microscopy to identify drugs / treatments that mitigate damage from radiation exposure. Results: We successfully developed the method to monitor and track individual colonoids over a 10-day period. By creating an automated software algorithm, we are now able to monitor the growth of a large population of colonoids over weeks. This semi-supervised approach is not only far less labour intensive then the previous manual scoring, but also minimizes subjectivity. Conclusion: We developed a methodology to screen for agents able to reduce radiation damage to colon organoids. This can now be applied to identify compounds or treatments that mitigate damage to the gut lining responsible for acute side effects in cervical cancer patients, which in some cases can also cause chronic consequences.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 258
Presenter: Joel Swai
Supervisor: Dacks, Joel
Title: Taxonomic distribution and primary structure of protein candidates in Pregnancy-associated Malaria: Evolution yields insight into possible function
Authors: Joel Swai, Sedami Gnidehou, and Joel Dacks

Theme: Pregnancy and developmental trajectories

Introduction: Plasmodium (P.) falciparum-infected erythrocytes (IEs) sequestration to placenta play a pivotal role in Pregnancy-associated malaria (PAM). This disease results in detrimental outcomes for both pregnant women and their fetuses. Antibodies against VAR2CSA antigen are important mediators of protection from IEs placental adhesion. However, the biological mechanism underlying such sequestration process is incompletely understood. We aimed to unravel the roles and evolution of 14 selected novel proteins co-expressed with VAR2CSA in PAM sequestration and to determine whether these proteins contribute to the unique vulnerability of pregnant women to malaria by facilitating the sequestration mechanism or other relevant pathways in P. falciparum biology. Methods: To address this, we examined the distribution and conservation of the selected proteins across a diverse range of eukaryotes, emphasizing the Apicomplexa phylum to which P. falciparum belongs; using bioinformatics including comparative genomics analyses. Results: We observed three different patterns of proteins distribution. Some proteins expression is specific to P. falciparum, suggesting that they may likely be involved in a mechanism that is restricted to P. falciparum. In contrast, while some proteins are conserved among Plasmodium species, other are conserved across Apicomplexans. Moreover, three of the 14 proteins displayed a shared domain (PHISTB DOMAIN-CONTAINING RESA-LIKE PROTEIN 1), hinting at a possible familial relationship and involvement in PAM pathogenesis. Conclusion: The study highlights the need to explore PAM-associated proteins further, fostering a deeper understanding of the unique health risks pregnant women face. We are investigating the detailed phylogenetic analyses of selected proteins to better understanding their evolution and potential functions.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 259
Presenter: Joelle Kasongo
Supervisor: Charlton, Carmen L
Title: Human Immunodeficiency Virus (HIV) seroprevalence among prenatal patients in Alberta, Canada: 2020-2021
Authors: N. Joelle Kasongo, L. Alexa Thompson, Carmen L. Charlton

Theme: Pregnancy and developmental trajectories

Introduction: In Alberta, pregnant women are screened for HIV at their first prenatal visit. According to the Alberta Sexually Transmitted Infections and HIV report, between 2020 and 2021 there was a 25% increase in HIV cases across the general population, however, it is unclear if this increase occurred among prenatal women. Methods: To investigate the seroprevalence of HIV infection in the prenatal population, all communicable disease prenatal samples tested between 2020 and 2021 (n=108,393) were extracted from the ProvLab Laboratory Information System (LIS). Prenatal patients testing positive for HIV antibodies were identified to investigate associations between demographic factors and seropositivity. Prenatal Hepatitis B (HBV), syphilis and Hepatitis C (HCV) results were extracted from ProvLab LIS to identify the prevalence of HIV coinfection with HBV, syphilis, and HCV. Data was stratified by age, geographic region, income quintile, health zone, HBV, syphilis, and HCV positivity, and descriptive statistics were analyzed using Chi-squared tests. Results: During the study period, 107,695 of 108,393 prenatal patients (99.4%) received HIV screening. Of those, 211 (0.19%) individual patients were HIV seropositive. Women aged 31-40 (n=99, 46.9%, p=<0.001) and those residing in metro regions (n=162, 81.4%, p=<0.001) had higher prevalence of HIV seropositivity. Calgary had the highest prenatal HIV seroprevalence (n=126, 59.7%, p=<0.001). The highest proportion of HIV seropositive patients were from the lowest income quintile (n=53, 26.6%, p=0.131), although this was not statistically significant. Out of the 211 HIV seropositive patients, one was coinfected with HBV (n=1, 0.47%, p=0.754) and one was coinfected with syphilis (n=1, 0.47%, p=0.798), although both coinfections were not statistically significant. Data analysis showed no coinfections with HCV. Seroprevalence increased by 0.02% between 2020 and 2021 yet there was an overall 26% decrease in prenatal HIV seropositive cases. Conclusion: These findings show the differences in demographic factors associated with prenatal HIV seropositivity. Although the Alberta Sexually Transmitted Infections and HIV report showed an increase in all HIV cases between 2020 and 2021, our analysis among pregnant women between those years showed a decrease in cases, indicating HIV testing and care continued to be prioritized in the prenatal population during this time period. Further work can be done to understand why prenatal patients are opting out of HIV testing in order to ensure all prenatal HIV cases can be identified during pregnancy and prevent losing prenatal patients to follow-up during treatment.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 263
Presenter: Elizabeth Cernigoy
Supervisor: Scott, Shannon
Title: Understanding Cultural Adaptation of Knowledge Translation Tools for Parents: A Study Protocol
Authors: Elizabeth Cernigoy, PhD(c), MScN, RN, Dr. Sarah Elliott PhD, Dr. Salima Meherali, PhD, RN, Dr. Shannon Scott, PhD, RN

Theme: Children's health and well-being

Introduction: Canada's population is ethnically diverse with 23% of Canada's population being foreign-born (8.3 million) and 31.5% of children under the age of 15 years having at least one parent born abroad (Statistics Canada, 2022). It is predicted that in the next twenty years, 50% of the Canadian population will consist of immigrants, also referred to as newcomers, and their Canadian-borne children (Statistics Canada, 2022). As Canada continues to become more diverse it is necessary to examine how best to deliver health information to improve health outcomes for a culturally and linguistically diverse population. A multi-phase project is being done to explore the experiences and information needs of culturally and linguistically diverse (CALD) parents to inform the cultural adaptation elements of KT tools. Methods: We are using an Interpretive Description approach with semi-structured parental interviews occurring in person or virtually (via Zoom). Eligible parent participants must be foreign-born from the Philippines, China, Syria, India or Nigeria, speak proficient English, and have a child under the age of 18 who has experienced fever(s). The interviews explore parents' experiences caring for a child with fever and during the interview, two existing KT tools are used as exemplars to facilitate discussion and identify information needs and any cultural adaptation elements that are required to improve parent tools. Participants are being recruited through purposeful, convenience and snowball sampling. The anticipated sample size is 15-20 parents with data collection and analysis occurring iteratively. Results: Research ethics approval has been obtained from the University of Alberta (Pro00126458). Recruitment and data collection commenced in August 2023 and will continue; comprehensive results are expected in Fall 2023. NVivo 2020® software is being used to manage the data analysis process. Data analysis is occurring concurrently with data collection to identify themes and patterns. The findings from parents' experiences with fever management and their recommendations for cultural adaptations to existing KT tools will inform future approaches to KT tool cultural adaptations. Conclusions: It is expected that this research will provide a new understanding of the experiences of CALD families with fever management and identify their information needs. Furthermore, the recommendations suggested by parents will provide newcomer families the opportunity to be involved and meaningfully contribute to informing future cultural adaptations to KT tools. The knowledge gained from this multi-phase research will inform future planning, design, and adaptation of KT tools for CALD families with the overarching goal of improving children's health outcomes.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 264
Presenter: Hetagna Modi
Supervisor: Gamper, Armin
Title: The Localization of Myt1 to Lipid Droplets and Its Consequences
Authors: Hetagna Modi, Julia Nickols, Joanne D. Hadfield, Samantha Blackwood, Amirali B. Bukhari, Wen-Hsin Hsu, Yea Jin Yoon, Min-Hsuan Wu, Gordon K. Chan, Armin M. Gamper

Theme: Lifelong women's health

Introduction: The Gamper Lab is currently studying ways to improve cervical cancer treatment. An emerging target for potential drugs and radiosensitizers is the kinase Myt1. Myt1 is involved in regulating the cell cycle at the G2/M checkpoint by phosphorylating CDK1. Wee1, a sister protein to Myt1, performs a nearly identical function, but it phosphorylates CDK1 at an alternate site. Wee1 inhibition has been shown to force the cell to undergo premature mitosis, resulting in cell death via mitotic catastrophe, while Myt1 inhibition lacked a similar effect on cell cycle progression. Interestingly, cervical cancer cells have demonstrated the ability to develop resistance to Wee1 inhibition by upregulating Myt1. This emphasizes the significance of Myt1 as a potential drug target and the necessity to test the newly developed Myt1 inhibitor, RP-6306. We have shown that Myt1 inhibition synergizes with ionizing radiation to kill cervical cancer cells. However, our current knowledge of Myt1 is quite limited and primarily focuses on its role as a backup to Wee1 in the cell cycle. Other aspects of the biology of Myt1 remain relatively unknown such as its localization. Previous research has indicated that Myt1 associates with the endoplasmic reticulum. Yet we found that Myt1 also localizes to lipid droplets inside cervical cancer cells. This is of interest as lipid metabolism is often upregulated in cervical cancer and raises a question about the relationship between lipid metabolism and Myt1 and how this may affect drug sensitivity in cervical cancer cells. This project aims to answer these questions to improve cervical cancer treatment in an attempt to enhance lifelong women's health. Methods: GFP-Myt1 tagged cervical cancer cells were incubated in either Low Serum Media (LSM) to induce starvation conditions, LSM with oleic acid (OA) to induce lipid droplet growth and formation, or LSM with OA and RP-6306. The localization of Myt1 to lipid droplets was observed via live cell imaging using the Spinning Disk Confocal Microscope to determine whether Myt1 activity is needed for lipid droplet formation. Western blots were also conducted to observe changes in Myt1 activity, as measured by phosphorylation of its target site of threonine 14 on CDK1, when lipid droplet formation is induced by OA. Results: After the addition of OA, an increase was observed in the number of fluorescent lipid droplets containing GFP-Myt1 in cervical cancer cells. Additionally, treatment with the Myt1 inhibitor did not appear to reduce the number of lipid droplets observed, suggesting that Myt1 localizes to lipid droplets but does not regulate their formation. Furthermore, western blots indicated an increase in the protein levels of CDK1 phosphorylated at threonine 14 when OA was added compared to starvation conditions, demonstrating that the kinase activity of Myt1 increases in response to an increase in lipid droplet population. Conclusion: Together, the data collected from live cell imaging and western blotting support the notion of Myt1 localization to lipid droplets and suggest that lipid metabolism influences the activity of Myt1. This could have repercussions for the treatment of cervical cancer, particularly its drug sensitivity to inhibitors of either Myt1 or Wee1.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 265
Presenter: Eliana Pyon
Supervisor: Hemmings, Denise G
Title: Interactions between bioactive lipids in the control of vascular tone in mice with differing estrogen levels
Authors: Eliana A. Pyon, Yebin Shin, Kaitlyn Visser, Denise G. Hemmings

Theme: Pregnancy and developmental trajectories

Introduction: Sphingosine-1-phosphate (S1P) and lysophosphatidic acid (LPA) are vasoactive lipids which may be regulated differently in non-pregnant (NP) females, pregnant females and males. S1P and LPA are predominantly vasodilators and interestingly, S1P, LPA and sphingosine (SPH), the non-bioactive precursor of S1P, are all higher in plasma from females. Moreover, estrogen increases expression of S1P receptor-1 (S1PR1) and SPH kinase-1 (Sphk1) which converts SPH to S1P. LPA production and Sphk1 expression are increased in pregnancy, however their influence on systemic maternal vascular tone is unknown. Mechanistically, research suggests that LPA and S1P pathways interact via binding of SPH to LPA and this inhibits the action of LPA on its receptors. We hypothesize that when LPA and excess SPH are present, LPA responses will be diminished and unbound SPH converted to S1P will be responsible for the effect on vascular tone. We expect that arteries from NP female mice will dilate more compared to those from males due to higher Sphk1 expression and S1P production. In pregnancy, we expect an adaptation to higher LPA and S1P levels leading to increased dilation compared to NP females partly due to increased S1PR1 and Sphk1 expression. Methods: NP female (n=15), pregnant (n=5) and male (n=14) C57Bl/6J mice were used. NP mice were tested for estrous stage visually or by crystal violet staining of vaginal lavage. Second order mesenteric arteries were dissected, mounted onto a pressure myograph system, equilibrated and preconstricted with U46619. LPA, SPH or the combination (LPA+SPH) with or without a Sphk1 inhibitor were intraluminally infused into arteries. Arterial diameter was measured. Sphk1 and S1PR1 expression in mesenteric arteries from NP female and male mice were assessed by Western blot with those from pregnant mice in progress. Results: Sphk1 but not S1PR1 expression was higher in arteries from NP female compared to male mice. LPA or SPH each induced dilation that was similar to that induced by LPA+SPH and this did not differ between sexes. Dilation to SPH was highly variable in arteries from NP female mice perhaps contributing to the lack of sex differences. Arteries from NP mice in proestrus or estrus exhibited little to no dilation to SPH compared to higher dilation in arteries from mice in metestrus or diestrus. Inhibition of Sphk1 blocked all dilation induced by LPA+SPH in both sexes. Arteries from pregnant mice showed increased dilation to SPH, but lower dilation to LPA+SPH compared to those from NP mice. Discussion: Variable responses to SPH and higher Sphk1 expression in arteries from NP females compared to those from males suggests a contribution of estrogen to the effects of LPA and S1P. Greater dilation to SPH seen in arteries from pregnant compared to NP females suggest a pregnancy adaptation. Inhibition of Sphk1 blocked all dilation to LPA+SPH, indicating that binding of SPH to LPA blocked its effects. Thus, dilation to uninhibited LPA+SPH was due to conversion of unbound SPH to S1P. Higher levels of SPH have not yet been tested and could lead to sex differences. When complete, this project will enhance our understanding of the impact of bioactive lipid interactions on vascular tone in mice with different estrogen levels

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 266
Presenter: Zain Patel
Supervisor: Tan, Qiumin
Title: Investigation of the developmental programmed cell death of Cajal-Retzius neurons in the hippocampus
Authors: Zain H. Patel, Mi Wang, Rebekah van Bruggen, Qiumin Tan

Theme: Children's health and well-being

Introduction Cajal-Retzius (CR) cells are a type of excitatory neuron that are crucial in the development of many structures in the brain including the neocortex and hippocampus. In mice and humans, a large number of CRs cells undergo programmed cell death during embryonic development and shortly after birth. While CRs in the neocortex undergo apoptosis, the mechanism by which CRs in the hippocampus die is largely unknown. A fine balance of CR cell survival and cell death is maintained, and disruption to this balance can contribute to various neurological disorders such as epilepsy. The goal of this project is to identify the mechanism by which hippocampal CRs undergo cell death and to examine the role of abnormally persisting CR cells on behaviour. Methods We have generated a mouse model where capicua (CIC), a gene crucial for brain development, is deleted from CR cells via specific expression of Cre recombinase. We validated the absence of CIC in our model by immunostaining for CIC, the Cre-dependent reporter tdTomato as well as the CR cell-specific marker Trp73. Brain tissue from mice at different developmental stages were immunostained for tdTomato and CR cell markers including Trp73 and Reelin to quantify CR cell density and assess the impact of CIC deletion on CR cell death dynamics. To assess the physiological outcomes of CIC deletion from CR cells, we conducted a battery of behavioural tests that assess hippocampal-related behaviors such as anxiety, learning and memory, and seizure susceptibility. Results Our results indicate that loss of CIC from CR cells in the mouse hippocampus results in their abnormal persistence to adulthood. CR cell density was similar between control and knockout (KO) mice in younger mice before CRs undergo cell death, suggesting there were no differences in the progenitor cell population. Our behavioral studies show that abnormal CR cell persistence due to loss of CIC, has no impact on behaviour. In all of the behaviour assays performed, there were no significant differences in the various parameters assessed, including anxiety, learning and memory. Furthermore, we did not observe any differences in seizure susceptibility between control and knockout mice. Overall, our results suggest that loss of CIC from CR cells increases CR cell survival in the postnatal brain without affecting neurobehaviours and seizure susceptibility. Future Directions To further determine the molecular basis of abnormal CR cell survival in the KO mice, we have performed single-cell RNA sequencing experiments on CIC-deficient CRs from developing hippocampus of control and KO mice. We are currently analyzing the data to determine key genes and pathways involved in the regulation of CR cell death. Preliminary results suggest that Bcl2, an anti-apoptotic protein, may play a crucial role in the mechanism of CR cell death. We will overexpress Bcl2 specifically in CR cells and determine the effect on CR cell death during development. Taken together, the results of this project will deepen our understanding of developmental programmed cell death. Furthermore, we will better understand the roles of CR cells in normal development and in diseases such as epilepsy and identify strategies to overcome abnormal CR cell death regulation.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 270
Presenter: Hannah Dean
Supervisor: Hammond, James
Title: Impact of the loss of slc43a3 on the expression of other genes associated with 6-mercaptopurine metabolism in mice
Authors: Hannah Dean, Aaron Sayler, Dr. James Hammond

Theme: Children's health and well-being

Introduction: Acute lymphoblastic leukemia (ALL) is the most common malignancy found in children, accounting for 32% of all childhood cancers in Canada. 6-mercaptopurine (6-MP) is a successful oral chemotherapy used in treating ALL; however, it is associated with adverse side effects in children such as myelotoxicity, hepatotoxicity, and gastrointestinal problems. In the interest of better understanding 6-MP, our laboratory previously identified the transporter responsible for its cellular accumulation, the equilibrative nucleobase transporter 1 (ENBT1) encoded by the SLC43A3 gene. Our laboratory recently acquired a global slc43a3-knockout mouse model. With this model, we intend to better our understanding of 6-MP biodistribution and metabolism by administering 6-MP to both wildtype and knockout mice and comparing the biodistribution of 6-MP and its metabolites via high-performance liquid chromatography (HPLC) of the tissues. However, before we can attribute differences in HPLC data to the absence or presence of ENBT1, we are tasked with confirming that there are no other confounding factors, such as compensatory changes in gene expression of the genes that contribute to 6-MP accumulation and metabolism. Methods: We euthanized and harvested organs from both wild-type and slc43a3-knockout mice. These tissues were then homogenized prior to RNA extraction using a TRIzol reagent. Following RNA extraction, we synthesized cDNA from each sample. We performed semi-quantitative polymerase chain reactions (qPCR) on organs of interest of both wild-type and knockout mice. The organs chosen were the heart, lungs, liver, kidney, duodenum, jejunum, and spleen. We quantified the mRNA expression of genes coding for proteins contributing to the accumulation and metabolism of nucleobases and nucleosides. In total, 18 different genes (slc43a3, slc23a4, abcc4, abcc5, slc29a1, slc29a2, slc29a4, tpmt, hprt1, prpps1, nudt15, aprt, gmps, xdh, impdh1, itpa, gapdh, actb) were analyzed using this qPCR method. Data was standardized using the delta Ct method; the geomean of two reference genes, actb and gapdh was subtracted from the obtained Ct values. This allowed us to detect differences in gene expression between the wild-type and knockout organ samples. Results: The wild-type mice expressed slc43a3 in all of the organs analyzed. mRNA expression of slc43a3 in mice is comparable to human expression levels previously published. The murine lungs and heart exhibited the highest slc43a3 expression out of the tissues studied. While the trends suggest no compensatory changes in gene expression between wild-type and knockout mice, the experimentation is still in progress. Further n-values will be achieved for statistical analyses prior to the presentation of this research. Conclusion: The results demonstrate that slc43a3 gene expression in wild-type mice shares similarities with human gene expression, contributing to our confidence in this model. The absence of slc43a3 does not appear to affect the mRNA expression of other genes involved in 6-MP metabolism. Once we increase the n-values to levels that will warrant statistical analyses, we aim to conclude how slc43a3 knockout impacts the expression of genes involved in 6-MP biodistribution.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 271
Presenter: Irshad Sayed
Supervisor: Lou, Edmond HM
Title: Assessment of the correlation between severity of spinal abnormalities and the bone quality reflection coefficient measured via ultrasound in adolescents with idiopathic scoliosis (AIS)
Authors: Irshad Sayed, Edmond Lou

Theme: Children's health and well-being

Introduction: This study aimed to assess bone quality in the L5 vertebra of adolescent idiopathic scoliosis (AIS) patients using quantitative ultrasound (QUS) and explore its correlation with AIS parameters, providing a safer alternative to X-ray imaging and the effects of the accompanying radiation as well as to determine the reliability of QUS imaging in assessing bone quality and quantifying spinal deformities. Methods: We recruited 136 AIS patients aged 10-18 years, without prior surgery. Using a SonixTouch Q+ ultrasound system, the study collected QUS data and measured key spinal parameters, including Cobb angle, axial vertebral rotation (AVR), kyphotic and lordotic angles, and curve type alongside bone quality of L5. We used a novel method from an initial pilot study to measure bone quality via the CARC (combined average reflection coefficient) value twice to evaluate bone quality and assessed measurement reliability through intraclass correlation coefficients (ICC). Results: The study found a reliable measurement method for CARC values in L5 (ICC = 0.95), indicating excellent correlation with similarly consistent results to readings from the current gold standard: X-ray images. The mean CARC values showed no significant differences between the two readings. CARC values showed a low correlation with any statistical trends in the measured angles. Conclusions: Quantitative ultrasound is a reliable method for assessing bone quality in the L5 vertebra of AIS patients. However, no significant correlations were observed between bone quality and AIS parameters in this study. This non-invasive, radiation-free technique can be a valuable tool for monitoring AIS progression, offering a safer alternative to traditional imaging methods. Further research is needed to explore the relationship between bone quality and scoliosis in a larger and more diverse patient population, as well as to monitor progression over time using the novel ultrasound methods. Keywords Scoliosis · Bone quality · Ultrasound imaging · Reflection coefficient (RC) · Reliability

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 272
Presenter: Patricia Oliva
Supervisor: Menon, Geetha
Title: Better Organ Delineation for Better Treatment Delivery: Artificial Intelligence-based Autocontouring of Critical Organs in Cervical Cancer Brachytherapy
Authors: Patricia Oliva, Shrimanti Ghosh, Kumaradevan Punithakumar, Fleur Huang, Pierre Boulanger, Jihyun Yun, Geetha Menon

Theme: Lifelong women's health

Introduction Improved outcomes in women with locally advanced cervical cancer (LACC) is achieved through precise irradiation of the tumor to large curative doses during radiotherapy, especially brachytherapy (BT), while sparing surrounding critical organs at risk (OARs; bladder, rectum, sigmoid, small bowel) to the greatest extent possible. Hence, accurate contouring (segmentation) of OARs is a crucial step when designing BT treatments. The standard practice of manual contouring by radiation oncologists is extremely laborious and time consuming (~3 hr) during treatment planning, with the additional problem of inter- and intra-user contouring variability. This work aims at developing a deep-learning (DL) algorithm to precisely autocontour OAR structures on MRIs used in BT treatment planning. Methods T2-weighted, 3D MRIs of 100 LACC patients, with all 4 OARs manually contoured (ground truth; GT) for planning BT treatments were selected. nnU-Net, the DL-method used for autosegmentation, adapts itself to a given dataset following the interdependencies in the dataset properties and choices in the network design. nnU-Net generates 3 default configurations: 2D U-Net, 3D U-Net, and 3D U-Net Cascade, each with 5-fold cross validation. The self-configuring capability allows selection of the best configuration or ensemble of any two configurations, which is the fully trained model that will receive the input (192x192x192) and output the DL-predicted OAR contour (binary mask; 192x192x192). nnU-Net is first separately trained for single-organ autosegmentation; OARs were chosen in order of increasing contour variability, i.e bladder, rectum, sigmoid, and finally small bowel. GT and DL-predicted contours are compared using Dice Coefficient (DC), Hausdorff Distance (HD), and 95% HD (HD95). Higher DC, lower HD, and lower HD95 values indicate better autosegmentation. Following this, a simultaneous 3D multi-OAR segmentation model will be developed for clinical translation. Results The datasets were separated for training (70), validation (15), and testing (15). nnU-Net generated 2 possible configurations to develop an autosegmentation model for the bladder: 2D U-Net and 3D U-Net. The generated 3D U-Net model with 5-fold cross validation is used for training (batch size=2, patch size=128, epochs=500, Dice and cross-entropy loss function, LeakyReLU activation function). The 5 models from each training fold are ensembled to create the final single-organ autosegmentation model used for testing. For bladder, the mean training times for one- and five-folds were 13.6 hr and 67.9 hr, respectively. Compared to GT, the DL-predicted bladder yielded a mean [min - max] of 0.93 [0.91 - 0.96] DC, 8.4 [4.0 - 15.0] mm HD, and 2.1 [1.0 - 3.0] mm HD95. The prediction time for the 15 test cases was only 3.98 min, demonstrating potential workflow improvements. Summary Preliminary results of single organ autosegmentation on 3D MRI with nnU-Net show promise in addressing manual contouring challenges; development of concurrent multi-organ autosegmentation is in progress. This novel DL-driven tool can advance LACC BT personalization for better BT quality and patient outcomes, likely reducing morbidity and mortality among survivors.

This research has been funded by the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 274
Presenter: Nicole Applin
Supervisor: Clugston, Robin
Title: The induction and prevention of diaphragm defects in a novel mouse model of congenital diaphragmatic hernia
Authors: Nicole H.M. Applin, Juan F. Garcia Rivas, Robin D. Clugston

Theme: Pregnancy and developmental trajectories

Introduction: Congenital Diaphragmatic Hernia (CDH) occurs at a rate of 1 in 3000 live births and is a significant health burden. Through either a true hole, sac, or an eventration defect in the diaphragm, abdominal contents encroach into the pleural cavity and affect lung development in utero. Current treatments can facilitate breathing, but cannot address the root cause of morbidity and mortality: the developmental malformation of the diaphragm and lungs. Therefore, the ideal solution would be to prevent the diaphragmatic defect in utero to allow for proper lung growth and development. However, this requires an understanding of the etiology of CDH and how it disrupts diaphragm morphogenesis; both of which remain largely unanswered questions. Current research highlights the importance of the mesenchyme derived from the embryonic pleuroperitoneal folds (PPF) and retinoic acid (RA) signalling in this tissue during development. Better understanding of gene-RA interactions in the PPF offers the possibility of preventing or rescuing the diaphragmatic defect in utero to address the developmental roots of this birth defect. Methods: Transgenic mice expressing a dominant negative retinoic acid receptor (Rardn) were bred with Prrx1-Cre mice, allowing us to conditionally block retinoic acid signaling in the pleuroperitoneal folds (PPF) of the developing diaphragm in fetuses, leading to CDH. To test whether the incidence/severity of the defect in this genetic model for CDH could be rescued, a pharmacological dose of RA was given to pregnant dams between embryonic day (E)8.5-13.5. At (E)16.5, dams were euthanized using isoflurane and fetuses were collected. Tail tips were collected to genotype for Prrx1-Cre and Rardn, as well as Sry for sexing. Diaphragm tissues were preserved in formalin for microscopic dissection to qualitatively phenotype diaphragm defects. Heart, lung, and kidney tissues were also collected for further analysis. Results: Prrx1-Cre:Rardn fetuses have 100% incidence of severe CDH (n=17), which is marked by edema and a significant decrease in left lung volume as measured by microCT. The incidence, severity and sidedness of the defect occurs equally in males and females. Maternal RA administration on (E)8.5-13.5 leads to an eventration-type defect in 50% of fetuses (n=6), a defect not seen in untreated or olive oil treated counterparts. This rescue phenotype is observed in both males and females and appears to be unbiased. In the other 50% of fetuses treated with RA, there is still a true hole defect seen suggesting that the rescue is not complete. Conclusion: Mesenchymal RA signaling is required for normal diaphragm development, as when it is conditionally blocked in Prrx1-Cre:Rardn fetuses a true hole-type diaphragmatic defect and CDH is seen 100% of the time. Moreover, this defect can be partially rescued by treatment with RA on E8.5-13.5, resulting in less severe eventration defects in 50% of double transgenic fetuses. Although the rescue phenotype is not complete, it supports a possible nutrient intervention for preventing the incidence and severity of this genetically-induced model of CDH.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 275
Presenter: Farhia Haque
Supervisor: Yokota, Toshifumi
Title: Development of Patient-Customized Antisense Oligonucleotide Therapy for Giant Axonal Neuropathy: Restoring GAN Gene Expression and Morphological Improvement
Authors: Farhia Haque, Satomi Shirakaki, Jessica Yang, Rohini Roshmi, Stanley Woo, Rika Maruyama, Hanna Kolski, and Toshifumi Yokota

Theme: Children's health and well-being

Introduction: Giant Axonal Neuropathy (GAN) is a rare autosomal recessive neurodegenerative disorder resulting from mutations in the GAN gene, which encodes the gigaxonin protein. GAN is characterized by muscle weakness and progressive loss of motor and sensory functions due to the degeneration of nerve axon fibers. Gigaxonin plays a pivotal role in regulating the cellular cytoskeleton, specifically the intermediate filament system, and protein degradation. Functioning as an E3 ubiquitin ligase, gigaxonin tags target proteins for degradation, preventing their harmful accumulation. Additionally, gigaxonin contributes to autophagocytosis by regulating the essential protein ATG16L1, crucial for autophagosome formation. In GAN neuropathy, mutations in the GAN gene disrupt protein turnover, leading to neurofilament accumulation, axonal swelling, and degeneration. While a cure for GAN is currently unavailable, advances in molecular genetics have opened doors to gene and nucleic acid-based therapies. We explore the use of synthetic DNA-like molecules called antisense oligonucleotides (ASOs) for GAN treatment. We hypothesize that ASOs induce splice modulation, restore full-length GAN expression, and lead to morphological improvement in a patient-derived cell model of GAN. Methods: In a child with GAN, we identified a mutation in intron 4 resulting in exon 5 skipping and out-of-frame transcripts. Patient-customized ASOs targeting intron 4 of the GAN gene were designed to induce exon 5 inclusion into the mature transcript. Various oligonucleotide chemistries, including 2'-O-methyl (2'-OMe), 2'-O-methoxyethyl (2'MOE), and phosphorodiamidate morpholino oligonucleotide (PMO), were employed to correct the mutation's effect in patient-derived fibroblasts. We utilized RT-PCR and Western blots to assess full-length mRNA levels and functional gigaxonin protein restoration. Immunocytochemistry was employed to quantify vimentin intermediate filament aggregates, evaluating ASO efficacy at the morphological level. Results: Promisingly, our designed ASOs, specifically PMO-based oligonucleotides, demonstrated significant exon 5 inclusion, marking the first successful restoration of full-length GAN expression with PMO treatment in vitro. Furthermore, we observed a substantial reduction in intermediate filament (IF) aggregates, notably vimentin, in fibroblast cells following ASO treatment. Conclusion: This study presents a crucial preliminary profile of n-of-1 ASO-mediated treatment for GAN. Our findings encourage further research to enhance ASO treatment efficacy and assess the safety of gene expression modification via ASOs for potential future clinical trials.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 276
Presenter: Harmol Aujla
Supervisor: Wine, Eytan
Title: Effect of indole-3-propionic acid on bacteria isolated from the appendix of children with ulcerative colitis
Authors: Harmol Aujla, Nazanin Arjomand Fard, Christopher Cheng, Eytan Wine

Theme: Children's health and well-being

Introduction: Indole-3-propionic acid (IPA) is a metabolite synthesized from the microbiota and has been shown to elicit beneficial effects in various areas of immune function. The aim of this study was to evaluate the impact IPA had on host-microbe interactions, including gene expression, bacterial invasion, membrane integrity, and biofilm formation. We hypothesized that indole-3-propionic acid reduces the invasion of potential pathogens and ameliorates inflammation in pediatrics with ulcerative colitis. Methods: Gentamicin protection assay was utilized to quantify bacterial invasion of Escherichia coli HB101 (non-invasive control), E. coli LF82 (invasive control), Klebsiella variicola, and Klebsiella pneumoniae isolated from the appendix and other non-inflamed sections of the colon of children with ulcerative colitis (UC) using gut cells (Caco-2) in both the presence and absence of IPA. Caco-2 cells infected with these mentioned bacteria were used to assess expression levels of occludin (tight junction protein), interleukin (IL)-8 (a pro-inflammatory cytokine), IL-10 (anti-inflammatory cytokine), and tumor necrosis factor-alpha (TNFα; pro-inflammatory cytokine) using quantitative polymerase chain reaction (qPCR) following treatment with IPA. Epithelial barrier integrity was measured by a transepithelial electrical resistance (TEER) assay following administration of IPA. Lastly, a biofilm assay was employed to assess the biofilm-forming capacity of the mentioned isolated bacteria following the administration of IPA. Results: Treatment of Caco-2 with IPA significantly decreased bacterial invasion; this effect was further amplified when the bacteria were also treated with IPA. qPCR data indicated a significant decrease in IL-8 expression while a decrease in IL-10 expression was visible, only the positive control (HB101) showed a significant decline. Although IPA treatment within the TEER showed a beneficial trend, no findings were of significant difference. Biofilm data showed no significant difference when IPA was administered. Conclusion: The study's results outline the multifaceted impact of IPA on various host-microbe interactions in the gut, relevant to pediatric UC, most notably seen in bacterial invasion and IL-8 gene expression. The additive effect seen when both the Caco-2 cells and bacteria were treated with IPA suggests the IPA-mediated pathways in both host and bacterial cells. The decrease seen in both IL-8 and IL-10 gene expression points to a larger downregulation in immune functioning. Shedding light on the mechanism of IPA could be translated to treatment or preventative therapy for children suffering from UC

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 277
Presenter: Myah Verghese
Supervisor: Kozyrskyj, Anita
Title: Association between home environment and perinatal depression: A systematic review
Authors: Sana Amjad, Myah Verghese, Solmaz Bohlouli, Liz Dennet, Anita Kozyrskyj

Theme: Pregnancy and developmental trajectories

Background: Perinatal depression is one of the leading causes of maternal morbidity and has long-term negative health implications for both mother and child. We conducted a systematic review to provide a critical appraisal of current evidence on the association between home environment and perinatal depression. Methodology: This systematic review is being conducted in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses-Equity Extension (PRISMA-E) guidelines. Four bibliographic databases (Medline, Embase, Scopus, and Web of Science) were searched from database inception to January 2023. Home environment factors were categorized as (1) general home characteristics [e.g., housing type, size, stability, and security] and (2) environmental exposures [cleaning agents/disinfectants, house dust, household air pollution, pests, pets, and molds]. We included observational studies (cohort, case-control, cross-sectional) that examined the impact of at least one home environment factor on perinatal depression. Two reviewers independently performed study selection, data extraction, and quality assessment. Narrative synthesis will be performed using effect direction plots and summary tables. Random effects meta-analysis will be conducted for sufficiently homogenous studies. Results: Literature searches yielded 5262 studies. After removing 2968 duplicates, 2294 articles were screened. Full-text screening was completed for 48 articles, of which 27 were included in the review. The included studies were published between 2003-2023, majority from the US, and included pregnant individuals aged 18-44. Home environment factors evaluated across studies included: household smoking (n=10), synthetic chemicals (n= 8; [perfluorochemicals n=3; PBDE n=3; Bisphenols/phthalates n=2], housing instability (n=4), air freshener/incense (n=2), air quality (n=2), noise (n=2) and pets (n=1). Most studies assessed depressive symptoms using the Edinburgh Postnatal Depression Scale (EPDS)(n=15). The analysis is ongoing. Conclusion: This systematic review will provide a comprehensive overview and evaluation of household characteristics and exposures contributing to maternal depression. Understanding the impact of the home environment on perinatal depression may help devise targeted interventions for pregnant individuals with the highest risk of poor mental health.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 278
Presenter: Abdullah Zia
Supervisor: Yokota, Toshifumi
Title: Delivery Shuttles Enhance Efficacy of Gapmer-Based Therapies in a Cell Model of Facioscapulohumeral Muscular Dystrophy
Authors: Abdullah Zia, Saeed Anwar, Rika Maruyama, Dominik Witzigmann, Karen Y.T. Chan, Pieter R. Cullis, Toshifumi Yokota

Theme: Children's health and well-being

Background: Facioscapulohumeral muscular dystrophy (FSHD) is a rare genetic disorder attributed to the misexpression of DUX4 in skeletal muscles, leading to progressive weakness in the facial, shoulder, and lower leg muscles. Currently, there are no available cures or treatments for FSHD. Gapmers, a class of antisense oligonucleotides (ASOs), offer a potential strategy for treating FSHD by inhibiting DUX4 expression. However, one of the main challenges in using gapmers is their inefficient delivery to their target cells. We have developed delivery systems and hypothesized that these systems could enhance the delivery efficacy and safety of gapmer-mediated DUX4 knockdown. Methods: Using an in silico tool, we designed a range of DUX4-targeting gapmers. Their off-target potentials were meticulously evaluated using GGGenome, a tool reminiscent of BLAST but optimized for short sequence queries. Subsequent commercial synthesis of these gapmers employed a couple of antisense oligonucleotide chemistries. Additionally, we developed a mini library of delivery shuttles. We transfected different doses of gapmers with or without delivery shuttles into patient-derived muscle cells and assessed the in vitro efficacy of gapmers using reverse transcription-quantitative polymerase chain reaction (RT-qPCR). Results: Our in vitro testing using FSHD-derived muscle cells demonstrated that our gapmers could efficiently suppress DUX4, with a remarkable 99% gene knockdown within 24 hours post-treatment at a 100 nM dose. Notably, only a 10 nM dose of the gapmers resulted in an effective reduction in DUX4 expression. We showed that select delivery shuttle formulations further improved this effect by enhancing the gapmer uptake by muscle cells. Conclusions: Our findings provide strong evidence for the synergistic potential of delivery shuttles and gapmers, suggesting a considerable enhancement in the efficacy of ASO-based treatments for FSHD. Moving forward, we are set to evaluate these gapmers, both independently and in conjunction with delivery shuttles, in an FSHD mouse model.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 279
Presenter: Mary Olukotun
Supervisor: Lemermeyer, Gillian
Title: Health of Black preterm infants in North America: a scoping review
Authors: Olukotun, Mary Musa, Salwa Kayode, Ibukun Price, Kimberly Salami, Bukola Lemermeyer, Gillian

Theme: Children's health and well-being

Introduction: Across North America, though Black preterm babies have comparable outcomes to infants of other racial and ethnic backgrounds in the neonatal intensive care unit (NICU), they have an increased risk of readmission and mortality after discharge. This phenomenon may be related to poor management in the community and differential access to health services and supports. Despite the documented racial disparities in wellbeing that often disadvantage Black preterm infants, to the best of our knowledge, there are currently no reviews that map what is known about their health outcomes. This scoping review thus aims to determine the nature, range, and extent of the literature on the health of Black preterm infants in North America. Methods: A scoping review of the literature was undertaken in adherence to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews guidelines (PRISMA-ScR). The study was guided by Arksey and O'Malley's scoping review framework as expanded by Levac et al. and the Joanna Briggs Institute. The following electronic databases were searched from inception to date: Medline, Embase, and PsycINFO via Ovid; CINAHL and SocINDEX via EBSCOhost; Sociological Abstracts via Proquest; Scopus via Elsevier. Reference lists of eligible articles were reviewed, and grey literature were searched from websites of agencies, institutes, and organizations that address infant health. Reviewers independently screened records using pre-determined inclusion and exclusion criteria then subsequently extracted and charted the data. Results: This study will provide a summary of the extant literature on the health of Black preterm infants in North America. Conclusion: In completing this review, we hope to map of the evidence on the health of Black preterm infants in North America. In addition to guiding future research, we anticipate the emergence of implications and recommendations for policy and practice.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 280
Presenter: Nada Mohamed
Supervisor: Westover, Lindsey
Title: Surface Topography as a Non--Invasive Clinical Screening Tool for Adolescent Idiopathic Scoliosis
Authors: Nada Mohamed, Mostafa Hassan, Jose Maria Gonzalez Ruiz, Qipei Mei, Lindsey Westover

Theme: Children's health and well-being

Introduction: Adolescent Idiopathic Scoliosis (AIS) is a paediatric condition characterized by an atypical lateral curvature of the spine that usually manifests during the early stages of puberty. AIS can affect children's physical health, psychological well-being, and quality of life. Diagnosis of AIS is primarily based on radiographic assessment, with the Cobb angle measurement being the gold standard for quantifying the severity of the spinal curvature. Observation is often recommended for mild curves, bracing is prescribed for moderate curves, and severe curves can require surgical correction. Early detection of AIS is crucial since timely intervention can prevent the curve from worsening and improve long-term outcomes. However, shortcomings of current screening tools for AIS highlight the necessity to create dependable and non-invasive alternative approaches. Surface topography (ST) quantifies surface trunk asymmetry and may be a potential non-invasive too for AIS screening. In this study, we aim to determine the ability of ST to predict and detect AIS from healthy adolescents. The primary objective is to develop a classification model using ST. The secondary objective is to compare different classification models. Methods: Surface torso scans were collected of participants with AIS (n=693) and healthy volunteers (n=298), all aged 10 to 18 years. The AIS group were identified through radiographic examinations, with curves ranging from 10° to 45°. Healthy volunteers in the control group were deemed eligible if their scoliometer test measured less than 7°. Procedure for ST analysis were as follows: reflecting the duplicated torso's 3D geometry and aligning with the original torso by minimizing the distance between points. Root mean square (RMS) and maximum deviation (MaxDev) were obtained from the deviations between the original and reflected torso. The extracted parameters were used as inputs to develop a decision tree model to detect AIS. 20% of the data was reserved for the decision tree model validation. Additionally, deviations and torso depths were mapped on 102 x 102 grids. Using the grid maps as inputs, a convolution neural network (CNN) was developed to classify ST of healthy adolescents and those with AIS. For development of the CNN model with two convolution and pooling layers, the data was split into 60% training, 20% validation, and 20% testing. Results: Significant difference was observed for RMS and MaxDev between the AIS group and controls ($p<0.001$). The accuracy, sensitivity, and specificity of the sample used to develop the decision tree was 86%, 100%, and 72%, respectively. The decision tree validated on the testing set had an accuracy of 77%, a sensitivity of 80%, and a specificity of 73%. A false positive rate of 28% was obtained. The alternative CNN model developed had a training accuracy of 96%. The performance of the CNN model using the testing set had an accuracy, sensitivity, and specificity of 95%, 96%, and 92%, respectively. Likewise, the testing set had a false positive rate of 4%. The CNN model outperformed the decision tree model. Conclusion: This study revealed ST as a promising tool for AIS screening. Future work involves comparison of ST screening model to common clinical screening tool.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 281
Presenter: Saeed Anwar
Supervisor: Yokota, Toshifumi
Title: Antisense Oligonucleotide-Mediated Exon 27 Skipping Restores Dysferlin Expression and Function in Dysferlinopathy Patient-Derived Cells
Authors: Saeed Anwar, Rika Maruyama, Toshifumi Yokota

Theme: Children's health and well-being

Background: Dysferlinopathy represents a spectrum of disorders that cause muscle weakness as a result of a deficiency of the protein, dysferlin. At the heart of this disease spectrum, there is loss-of-function mutations in the DYSF gene, which encodes the dysferlin protein. Dysferlin is essential for muscle cell membrane repair. Currently, there is no established cure or treatment for this group of diseases. Dysferlin, with its multiple calcium dependent C2 domains, retains partial functionality even in the absence of some domains, providing a rationale for exploring exon skipping therapies in dysferlinopathies. Exon skipping employs synthetic DNA analogs, called antisense oligonucleotides (AONs), to adjust splicing, correcting the reading frame by omitting certain exons near mutations. With evidence supporting its potential, this study focuses on exon 27 skipping as a potential therapy for dysferlinopathy. Methods: We examined mutation statuses in patient-derived myoblasts using Sanger sequencing and gauged their impact on RNA and protein levels through reverse-transcriptase PCR (RT-PCR) and western blotting, respectively. Using an in-house developed computational tool, we designed three AONs to target DYSF exon 27 for testing in vitro with an exon 26 splice site mutation. The AONs' efficiency was evaluated in myoblasts and myotubes, with exon skipping and in-frame transcript restoration assessed via RT-PCR. Dysferlin protein rescue was determined with western blotting. The safety of the AONs was validated through an Annexin V apoptosis assay and a cell viability assessment. Lastly, a membrane-wounding assay gauged the membrane repair capability of the treated cells. Results: Mutation analysis indicated that skipping exon 27 in patient-derived cells could restore the reading frame. With approximately 90% DYSF exon 27 skipping efficiency achieved at only a 10 μM dose, AON treatment restored over 40% of dysferlin protein. Furthermore, a membrane wounding assay with a two-photon laser highlighted functional recovery in muscle cells after exon 27 skipping. The apoptosis assay and cell viability assessment studies indicated the safety of the exon skipping AON treatment. Conclusions: This study underscores the potential of exon 27 skipping in restoring dysferlin expression and function, laying groundwork for future in vivo studies and clinical applications in dysferlinopathy treatment.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 282
Presenter: Olivia Sadilek-Thring
Supervisor: Clugston, Robin
Title: Hepatic vitamin A metabolism is perturbed in young iron deficient rats
Authors: Sadilek-Thring, O.S. Holody, C.D. Bourque, S.L. Clugston, R.D.

Theme: Pregnancy and developmental trajectories

Background: Women of reproductive age and young children are at particularly high risk of developing iron deficiency (ID) due to the increased physiological demands of growth and development processes. ID is the most common nutritional deficiency worldwide, and frequently co-occurs with vitamin A (VA) deficiency. VA, in its metabolically active form retinoic acid, plays a fundamental role in fetal and child development, and its insufficiency can manifest in clinically significant ways (e.g. confidential malformations). Previous literature reports that ID disrupts the mobilization of VA from the liver, thereby interfering with its critical physiological actions. However, the mechanisms by which this occurs are unclear. Here, we tested the hypothesis that ID inhibits the hepatic secretion of retinol binding protein (RBP4). Methods: Female and male weanling rats were randomly assigned to receive either a control diet (35 mg/kg iron) or an iron-deficient diet (3 mg/kg iron). Hemoglobin levels were assessed bi-weekly. After six weeks of dietary intervention, all animals were euthanized and tissues were collected. Reverse-phase HPLC was used to measure plasma and liver VA concentrations; plasma RBP4 levels were determined using ELISA and immunoblotting; and hepatic gene and protein expression were quantified using qPCR and immunoblotting, respectively. All data were analyzed by 2-way ANOVA with Sidak post hoc test using GraphPad Prism software. Results: Dietary iron-restriction caused a progressive decline in hemoglobin levels in both male and female rats throughout the experiment, culminating in a -73% drop in females ($p < 0.0001$) and a -79% drop in males ($p < 0.0001$). Other changes were most notable in males, including: decreased plasma retinol (-42%, $p < 0.0001$); decreased plasma RBP4 expression (-64%, $p < 0.0001$); increased hepatic retinyl esters (+44%, $p < 0.05$); and increased hepatic RBP4 expression (+57%, $p < 0.05$). Conclusion: We have shown for the first time that ID lowers circulating RBP4 levels while simultaneously increasing its hepatic expression in young rats, suggesting ID interferes with secretion of RBP4 from the liver. These findings provide a mechanistic basis for the interaction between ID and VA deficiency. Considering the serious health implications of disrupted VA metabolism, it is important that more be known about its mechanistic basis in order to develop and implement appropriate prevention and treatment strategies, especially within high risk populations.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 283
Presenter: Annie Tang
Supervisor: Yokota, Toshifumi
Title: Enhanced efficacy of antisense gapmers in facioscapulohumeral muscular dystrophy using small molecules: insights from in vitro studies
Authors: Annie Tang, Saeed Anwar, Scott David-Bittner, Rika Maruyama, Hong Moulton, Toshifumi Yokota

Theme: Children's health and well-being

Background: Facioscapulohumeral muscular dystrophy (FSHD) is an autosomal dominant disorder affecting approximately 1 in 8,000-22,000 individuals globally. It causes progressive weakness and deterioration in the muscles of the face, shoulders, arms, and legs of males and females. There is an infantile form of FSHD, which results in a more severe course of the disease. FSHD causes a significant lifelong disability, with 20% of afflicted individuals becoming completely wheelchair dependent. Two primary mechanisms underlie FSHD: the contraction of the D4Z4 repeat array (FSHD Type I) and mutations in SMCHD1 causing hypomethylation of the D4Z4 array (FSHD Type II). Both pathways culminate in the overexpression of the harmful DUX4 protein. Strikingly, expression in only 1 out of every 200-2,000 muscle cells precipitates a cascade leading to muscle atrophy and the consequent irreversible disability characteristic of FSHD. Unfortunately, there is neither a cure nor a treatment specific to FSHD in the clinic to date. Antisense oligonucleotide (ASO)-based therapies offer a promising strategy for effectively knocking down genes. Several reports, including ours, have demonstrated the feasibility of ASOs in inhibiting DUX4 expression. While these studies are promising, there remains a need to knock down DUX4 expression more effectively and safely before it can be translated to clinics. Here, we tested our hypothesis that the use of small molecules significantly improves the efficacy of ASO-mediated knockdown of DUX4 expression and its safety profile in cell and mouse models. Methods: Using an in silico tool developed by our lab, we have designed several gapmers, a class of ASOs, targeting DUX4. Also, we have created a mini-library of small molecules by repurposing molecules already FDA-approved or heavily researched for other indications to improve the safety and efficacy of these gapmers. Gapmers were transfected, both independently and in combination with small molecules, into FSHD patient-derived muscle cells. DUX4 expression and its downstream gene activity were quantified using reverse transcription-quantitative polymerase chain reaction (RT-qPCR). Results: We observed that these small molecules enhanced gapmers delivery into FSHD patient-derived muscle cells, increasing DUX4 transcript knockdown efficiency in a non-cytotoxic, safe manner. This also resulted in a significant decrease in the expression of DUX4 downstream genes ZSCAN4, TRIM43, and MBD3L2. Conclusions: Preliminary data strongly support the superior efficacy and safety of gapmer-small molecule combinations. Future work will focus on validating these promising in vitro results using an FSHD mouse model.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 284
Presenter: Amyna Ismail Rehmani
Supervisor: Meherali, Salima
Title: Impact of the COVID-19 Pandemic on Sexual and Reproductive Health of Adolescents in Alberta
Authors: Dr. Salima Meherali, Dr. Bisi Adewale, Ms. Samar Kauser, Ms. Mariam Ahmad, Ms. Amyna Ismail Rehmani, Dr. Shannon Scott, Dr. Simone Lebeuf, Dr. James Benoit

Theme: Children's health and well-being

Introduction: This study aims to explore the experiences of adolescents and their sexual and reproductive health (SRH) during the COVID-19 pandemic, focusing on understanding the potential role of digital SRH strategies in addressing inequitable access to SRH information, programs and resources. The objectives include identifying adolescents' preferred methods of accessing SRH resources and assessing the potential benefits and drawbacks of using an app to provide SRH information, resources and support. Method: This is a qualitative study involving interviews with adolescents from diverse backgrounds in terms of socioeconomic status, gender identity, sexuality, race, and ethnicity. The study used semi-structured qualitative interviews as the primary data collection method, and thematic analysis was used to identify patterns and insights related to the participant's experiences and perceptions of SRH during the pandemic and their outlook on digital strategies for SRH. The study was conducted using a culturally sensitive approach, recognizing the importance of language, culture, and diversity in understanding the experiences of adolescents. The study also used a community-based participatory research (CBPR) approach, engaging community members and service providers in the research process to ensure that the findings are relevant and applicable to the community. Results: The study found that the COVID-19 pandemic negatively impacted adolescents' mental health and exacerbated existing barriers to SRH resources. Participants expressed support for developing an app for SRH resources, as they believed it could increase access to information and resources for marginalized groups, particularly during the COVID-19 pandemic. The study also identified various strategies suggested by the participants, such as simplified interfaces, anonymous forums, helplines, and quick access to resources and nearby services. However, some participants expressed concerns about the safety, anonymity and credibility of information on mobile applications. Conclusions: The study successfully identified adolescents' preferences and concerns regarding digital SRH strategies and their potential role in addressing barriers to accessing SRH information, resources and services during the COVID-19 pandemic. The findings suggest that interventions to support adolescent SRH should consider developing an app that addresses the accessibility of resources and services for diverse groups of adolescents while ensuring the anonymity of users and the credibility of the information provided. Additionally, these interventions should consider the importance of privacy, confidentiality, culture, communication with support networks, and the use of social media in promoting SRH and reaching a diverse audience. By doing so, digital SRH strategies can contribute to inequitable access to SRH resources and support among adolescents.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 285
Presenter: Taylor Walsh
Supervisor: Charlton, Carmen L
Title: Positivity trends and demographics of chlamydia and gonorrhea in pregnant women in Alberta
Authors: Taylor M. Walsh, L. Alexa Thompson, Sabrina S. Plitt, Carmen L. Charlton

Theme: Pregnancy and developmental trajectories

Introduction: Chlamydia (CT) and gonorrhea (NG) infection in women can lead to pelvic inflammatory disease which can contribute to infertility, ectopic pregnancy, and chronic pelvic pain. CT/NG positive women risk transmitting the infection to their infant during delivery. In 2018, the Alberta government updated prenatal screening guidelines to include CT/NG testing during the first trimester of pregnancy. This study aims to analyze CT/NG positivity trends and guideline adherence and describe demographics for individuals with at least one positive CT/NG result. Methods: Birth data and CT/NG testing data were extracted from the Laboratory Information System and DynaLife CT/NG database between January 1, 2019 and December 31, 2022. STATA (version 17.0) was used to merge datasets by personal health number. Individuals were considered to be positive for CT/NG when ribosomal RNA (rRNA) was detected in specimen samples. CT/NG positivity was stratified by screening trimester to evaluate trends in positivity and proper guideline adherence (screened in first trimester). Descriptive statistics were evaluated between positive individuals tested in line with, or against, screening guidelines, and Chi2 tests were used to determine significant findings. Results: 3,297 positive results were found throughout the study period. Trimester stratification show a majority of individuals screened positive during their first trimester (n=1,646, 49.92%), followed by second trimester (n=967, 29.33%), and third trimester (n=663, 20.11%), with the least being screened positive at delivery (n=21, 0.64%, up to 2 days after birth). Out of 144,253 uniquely screened individuals, 2,722 were positive at least once during their pregnancy (1.89%). Demographics analyzed showed decreased guideline adherence in central and southern Alberta health zones (p=0.002), lowest income quintiles (p=0.004), and women aged 13-20 (p=0.044). Conclusion: Current trends in CT/NG positivity shows that the majority of women are testing positive in their first trimester following proper guidelines. However, many individuals were positive at more than one time point in their pregnancy, indicating reinfection or lack of treatment. Additionally, those residing in lower income quintiles showed decreased adherence to guidelines. A universal third trimester screen should be considered to ensure treatment success and decrease risk of transmission prior to delivery.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 286
Presenter: Yared Aynalem
Supervisor: Meherali, Salima
Title: Climate Change & RMNCAH (Reproductive Maternal, Newborn, Child, & Adolescent Health): Evidence Gap Map Exercise
Authors: Dr. Salima Meherali, Yared Aynalem, Saba Nisa, Mariam Ahmad, Dr. Bukola Salami, Dr. Solina Richter, Dr. Samuel Adjorlolo, Dr. Kenia Lara Silva, Dr. Parveen Ali, Dr. Zohra Lassi.

Theme: Children's health and well-being

Introduction: This study aims to delve into the effects of climate change on Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCAH) and associated rights. We have specifically centered our attention on the vulnerable populations-women and children globally. The primary aspiration is to reinforce the bond between climate change, health, and women's and girls' rights advocates. This would enable a gender-sensitive approach to climate actions by pinpointing the intersections between climate change and RMNCAH throughout climate action initiatives. This interdisciplinary project involves collaboration with scholars from five continents: North America, South America, Europe, Africa, and Oceania. Methods: This project will consist of three main activities: 1. Development of an Evidence-Gap-Map (EGM) of literature concentrating on the influence of climate change on RMNCAH. EGMs offer a systematic evidence synthesis, illustrating available evidence pertinent to a specific research query. EGMs are apt for spotting gaps that need further evidence, accumulating studies for review, and enhancing the discoverability and utilization of studies by various stakeholders. Our approach will emulate the standards and methods for EGMs as established by the Campbell Collaboration. 2. Conducting two workshops to engage with vital stakeholders, including policymakers. 3. Organizing a webinar for graduate students and budding public health experts to accentuate the significance of planetary health. Results: By undertaking this project, we intend to unify knowledge and assemble a research team to inspect the consequences of climate change on RMNCAH and rights. Our predictions lead us to believe we'll uncover both direct and indirect repercussions of climate change on our target groups-women and children globally. In the short run, the academic yield of the initiative will be the gathering and synthesis of extant literature on the ramifications of climate change on RMNCAH. The anticipated deliverables comprise the creation of an evidence gap map and contributions to peer-reviewed journals, thereby shedding light on current gaps in research and charting territories for prospective studies. Conclusion: This study serves as a precursor to more extensive endeavors, with our team discussions culminating in a funding proposition for an overarching project aiming to unearth efficacious adaptive mechanisms to tackle climate change and concurrently bolster RMNCAH. Additionally, we plan to curate a policy brief targeting major national and global agencies like the Public Health Agency of Canada, World Health Organization, and more. This brief will advocate for investments in research tailored to bridge evidence gaps and amalgamate the analyses of RMNCAH with climate data, paving the way for more holistic and impactful strategies.

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 287
Presenter: Megan Wilson
Supervisor: Davenport, Margie
Title: The impact of heavy deadlifts during pregnancy on maternal and fetal health
Authors: Megan Wilson, Amy Moolyk, Brittany Matenchuk, Matt Gervais, Gyan Bains, Margie Davenport

Theme: Pregnancy and developmental trajectories

INTRODUCTION: Female participation in strength-focused sports (e.g., CrossFit) has risen dramatically over the last decade. Given the distinct lack of empirical evidence supporting (or not) the safety of heavy weightlifting and the Valsalva maneuver prospective studies examining maternal and fetal physiological responses to acute exercise are urgently needed. This study aims to examine the maternal and fetal cardiovascular responses to heavy deadlifts during pregnancy 1) with and without the Valsalva maneuver, and 2) compare maternal cardiovascular responses to heavy deadlifts between pregnant and non-pregnant individuals. We hypothesize that fetal heart rate will remain in normal ranges during heavy deadlifts (including Valsalva) and maternal cardiovascular responses to heavy deadlifts will not be different between pregnant and non-pregnant individuals. METHODS: We recruited 9 pregnant and 11 non-pregnant individuals (>20 years, 2nd or 3rd trimester of pregnancy). Participants visited the lab on two occasions. On the first visit, individual 10RM for the deadlift was determined. On the second visit, the participant completed four sets of deadlifts: • 10 reps at 70% 10RM with free breathing, • 10 reps at 80% 10RM with free breathing, • 10 reps at 90% 10RM with free breathing, and • 10 reps at 90% 10RM with a standardized Valsalva maneuver (per above) during each rep. Before and after exercise, maternal heart rate and blood pressure, as well as fetal heart rate were measured to determine the safety of the exercise. RESULTS: Pregnant and non-pregnant participants were similar in age (35 ± 6 and 33 ± 3 years, respectively) and preconception BMI (22 ± 9 and 27 ± 3, respectively). Pregnant participants were 27 ± 3 weeks gestation. As expected, resting maternal heart rate (pregnant: 76 ± 6 vs non-pregnant: 71 ± 9 BPM) was higher, and blood pressure (pregnant: 101 ± 6/63 ± 5 vs non-pregnant: 110 ± 6/75 ± 6) was lower than non-pregnant participants but maternal heart rate was not different between groups during exercise. The deadlift weight increased from set 1 - 3/4 in both pregnant (set 1: 98 ± 21 lbs, set 2: 112 ± 24 lbs, set 3: 126 ± 28 lbs, set 4: 126 ± 28 lbs; $p<0.05$) and non-pregnant (set 1: 112 ± 28 lbs, set 2: 129 ± 32 lbs, set 3: 144 ± 36 lbs, set 4: 144 ± 36 lbs; $p<0.05$) participants, and they were not different between groups at each stage. Fetal heart rate remained within normal ranges before and after exercise, and fetal bradycardia was not observed. CONCLUSION: Our findings suggest that heavy deadlifts are well tolerated by both mother and fetus. The Valsalva maneuver had no significant impact on maternal and fetal cardiovascular responses, and the maternal response was not significantly different between pregnant and non-pregnant individuals during heavy deadlifts.

This research has been funded by the Stollery Children's Hospital Foundation and the Alberta Women's Health Foundation through the Women and Children's Health Research Institute.

Participant #: 291
Presenter: Jacob Korodimas
Supervisor: Seubert, John
Title: Age-specific response to LPS-induced endotoxemia in sEH null female mice
Authors: Ala Yousef, Jacob Korodimas, Deanna Sosnowski, John M Seubert

Theme: Lifelong women's health

Purpose: Older individuals become more susceptible to external stressors due to a decline in their biological systems. Exposure to environmental toxins is well known to cause adverse effects which are exacerbated in older individuals, for example, lipopolysaccharide (LPS)-induced endotoxemia can result in a multiorgan inflammatory response leading to cardiac dysfunction worsening with age. The metabolism of PUFAs by CYP450 enzymes produces numerous bioactive lipid mediators that can be further metabolized by soluble epoxide hydrolase (sEH) into diol metabolites, often with reduced biological effects. Previous research has demonstrated genetic deletion of sEH is cardioprotective and limits LPS-induced inflammation in young male mice. However, the cardioprotective effect of sEH deletion in young and aged female mice has not been investigated. Methods: Young (2-5mo) and aged (18-25mo) female wild type (WT) and sEH null mice were administered either saline (control), 1 mg/kg or 10 mg/kg LPS via i.p. injection. Echocardiography was used to assess cardiac function at baseline and 24 hours after injections. Cardiac inflammatory markers IL-6, MCP-1, NLRP3, and Il-1β and senescence markers p21, p16, and senescence-associated β-galactosidase were determined using qPCR. Results: Both WT and sEH null young female mice demonstrated tolerability toward LPS exposure without significant changes in cardiac function. However, sEH deletion improved survivability, preserved cardiac function and significantly reduced inflammatory and senescent markers in aged female mice. Conclusion: These data highlight age-dependent differences in female response to acute LPS exposure. Targeting sEH in older females may be an effective strategy for alleviating age-related susceptibility to endotoxemia-induced cardiac dysfunction.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 292
Presenter: Lori-Ann Sacrey
Supervisor: Zwaigenbaum, Lonnie
Title: Comparative Strengths and Challenges on Face-to-Face and Computer-Based Attention Tasks in Autistic and Neurotypical Toddlers
Authors: Lori Sacrey, Lonnie Zwaigenbaum, Isabel M Smith, Jessica Brian, Sam Wass

Theme: Children's health and well-being

Introduction: Exercising control over attention is thought of as a 'hub' cognitive faculty, required to acquire skills in a range of other domains (Karmiloff-Smith, 1998; Wass et al., 2012). The purpose of this research was to examine (1) attentional performance between neurotypical (NT) children and children diagnosed with autism spectrum disorder (ASD) and (2) changes in attention performance for children diagnosed with ASD who complete an attention training intervention. Methods: First study: Autistic toddlers (n=23) and matched NT peers (n=19) completed an Attention Assessment to measure (1) joint attention, as well as computer-based attention games that target (2) sustained attention (maintaining gaze on stimuli), (3) disengaging attention (shifting attention from one stimuli to another), and (4) cognitive control (inhibiting a learned rule to learn a new rule). Second study: Autistic toddlers were randomly assigned to an attention intervention (n = 34) or placebo condition (n=35). All children completed the Attention Assessment both before and following the intervention. The attention intervention involved dynamic games that used visual characters (which responded to eye gaze) to targeted goal maintenance, short-term memory, and target searching. The control condition used 3 minute clips of children's cartoons that did not respond to the child's gaze. All children completed Autism Diagnostic Observation Scale - 2nd Edition and Mullen Scales of Early Learning assessments to measure ASD symptomatology and development. Linear mixed modelling was used to compare performance across the four attentional domains between autistic toddlers and their NT peers. Results: In the first study, Autistic toddlers showed reduced levels of initiating and responding to joint attention, as well as more time looking at boring and interesting still images in the sustained attention task compared to NT peers. Autistic toddlers performed similarly to their NT peers on the gap-overlap task and measures of cognitive control. In the second study, Autistic toddlers who attended the attention intervention showed improvements in measurements of joint attention and spent less time looking at interesting stimuli compared to toddlers who did not receive the intervention. There were no differences between the gap-overlap task and measures of cognitive control between the two groups. Conclusion: These results suggest that in addition to attention challenges, autistic toddlers have attention strengths that could provide a foundation for building attention, communicative, and ultimately, academic skills. Technological methods that rely on gaze may be useful to assess or provide intervention for very young children with and without developmental delays

This research has been funded by the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Participant #: 294
Presenter: Saba Nisa
Supervisor: Meherali, Salima
Title: Challenges South Asian Immigrant Youth Face in Transnational Contexts
Authors: Dr. Salima Meherali, Dr. Bisi Adewale, Samar Kauser, Saba Nisa, Mariam Ahmad

Theme: Children's health and well-being

Introduction: The purpose of this study is to address the knowledge gap on the challenges faced by South Asian immigrant youth (SAIY) in Canada, who hold multiple marginalized identities, to inform policies, programs and services to serve SAIY. This study seeks to explore the barriers SAIY encounter while adjusting to life in Canada, understand how these challenges impact their integration into Canadian society, and assess their experiences building healthy social networks and accessing social opportunities. Method: This study employed a qualitative descriptive design to explore the experiences and views of SAIY and their parents in Alberta. Using a convenience sampling strategy, participants were recruited via social media, community centers, and immigrant service agencies in Edmonton. 23 SAIY and 13 unrelated parents were included, with interviews conducted in the different languages of the participants, audio recorded, and back-translated into English. Data collection and analysis were conducted concurrently using virtual, semi-structured, individual interviews and inductive thematic analysis. Interview topics encompassed their overall experiences, challenges faced, and perspectives on youth-focused programs and services in Alberta. Demographic data were analyzed using descriptive statistics, while rigour was maintained through the involvement of trained research team members, collaborative critique of findings, reflexive journaling, and field notes. Results: Thematic analysis revealed intersectional challenges faced by SAIY, impacting their physical, social, and mental health, as well as overall well-being. Key findings include issues related to cultural diversity, identity, and employment, as well as the perspectives of parents of SAIY, who emphasized the importance of addressing racial discrimination, the availability of mental and sexual health programs, and the social welfare of their children. Conclusions: The challenges that SAIY face as they attempt to adjust to Canadian society are intersectional and affect them differently. Balancing these conflicts and challenges may impact the physical, social, and mental health and overall well-being of SAIY. Investigating specific issues, such as cultural diversity, identity, and employment and how they impact SAIY is important for developing evidence-based practices, programs, and policies. It is also critical to understand the perspectives of parents of SAIY and issues that they perceive to be important to address, such as racial discrimination, the availability of mental and sexual and reproductive health programs, and the social welfare of their children. This information is needed to develop strategies to help SAIY adapt to Canadian society. Our study provides insight into the challenges and barriers SAIY contend with as they adjust to life in Canada, an issue that has been under-researched. Further studies are needed to address the health disparities SAIY face and improve outcomes for this population.

This research has been funded by the Stollery Children's Hospital Foundation through the Women and Children's Health Research Institute.

Participant #: 296
Presenter: Ricky Liu
Supervisor: Hornberger, Lisa K
Title: The complementary role of fetal atrial and ventricular function from the first trimester
Authors: Ricky J. Liu, Dora Gyenes, Luke Eckersley, Alberta Pasco, Angela McBrien, Lisa K. Hornberger

Theme: Pregnancy and developmental trajectories

Introduction: Embryonic development of the human fetal heart is completed by 7-8 weeks of gestation. Thereafter, the cardiac chambers evolve and function to maintain an adequate circulation for fetal growth to term. While the evolution of ventricular function in the mid and third trimesters has been studied for decades, less is understood about early fetal heart function. Furthermore, the role of the fetal atria has been minimally explored. We aimed to investigate changes in fetal atrial and ventricular function and their relationship in the human fetus from 6 weeks to term. We hypothesized that fetal atrial pump function is most robust at early stages, decreasing with normal improvements in ventricular diastolic function. Methods: We analyzed fetal echocardiograms performed cross-sectionally from 6-39 weeks of gestation in healthy recruited pregnant subjects, and measured atrial and ventricular dimensions and Doppler-based parameters of cardiac function, examining changes with gestation with linear or non-linear regression being performed as appropriate. Results/Discussion: A total of 277 singleton fetuses were examined. While atrial dimensions progressively increased with gestation, atrial/total cardiac area was greatest at <10 weeks, acutely decreased by 14-15 weeks and minimally changed thereafter. Ventricular dimensions also increased with gestation. Early ventricular function by Doppler was characterized by single uniphasic short duration ventricular filling in atrial systole at earliest ages progressing to biphasic patterns by 1 weeks with progressive increase in early filling thereafter, an acute increase in ventricular inflow durations relative to the R-R interval at <14 weeks, plateauing thereafter concomitant with an acute decrease in isovolumic relaxation and contraction times and a steady decrease in ejection times/R-R interval throughout gestation. Both left and right atrial/ventricular ejection force ratios followed an exponential decay related to higher inflow relative to outflow velocities and shorter inflow to ejection durations most striking at <14 weeks. Conclusion: There exists an intricate interplay between fetal atrial and ventricular function, with the atria serving a more predominant role particularly in the first trimester at a time when Doppler-based function parameters suggest less robust diastolic and systolic function.

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Participant #: 297
Presenter: Seniha Gulluk
Supervisor: Gamper, Armin
Title: Wee1 and Myt1 kinase inhibitors as senolytic agents for radiation induced senescent breast cancer cells
Authors: Seniha Gulluk, Ben Spilak, Sean Malia, Yousef Darwish, Kenaan Ramji, Jerome C. Bartolome, Gordon K. Chan, Armin M. Gamper.

Theme: Lifelong women's health

Introduction: Breast cancer is the most prevalent cancer in women. Postsurgical radiation therapy is one of the treatments used to kill cancer cells to prevent cancer recurrence. Yet some breast cancer cells in heterogeneous tumors are known to survive and instead to undergo cellular senescence. Despite their stable exit from the cell cycle, senescent cancer cells are harmful because they can contribute to tumor metastasis, suppression of the anti-cancer immune response and angiogenesis via their Senescence Associated Secretory Phenotype (SASP). Senolytics are drugs that selectively kill senescent cells. Hypothesizing that targeting kinases in the DNA damage response could harm senescent cells, we tested inhibitors of ATR, Wee1, and Myt1 kinases. We are currently investigating the mechanisms underlying the senolysis, specifically the mode of cell death. These findings will provide the basis for future studies to determine optimal therapeutic use. As inhibitors for Myt1 and Wee1 are entering clinical trials, these inhibitors may be useful in a "double punch" cancer treatment approach, where ionizing radiation can be followed by senolytic administration to clear remaining senescent cancer cells from the body. Methods:This project aims to test the efficiency of senolytic drugs, which target the DNA damage response and cell cycle checkpoints. This could greatly improve breast cancer treatment. We tested the following kinase inhibitors: AZD1775 and DEBIO 0123 (Wee1 inhibitors) and RP6306 (Myt 1 inhibitor). As a model system to measure senolytic efficacy, the triple negative breast cancer cell line MDA-MB-231 was used in this study. Therapy induced senescence was mimicked by irradiation with 8 Gy on a Cs137 source. After a 7 day incubation period the cells are confirmed senescent via morphological appearance under the microscope. These cells are then treated with the various kinase inhibitors, alone and in combinations. B- galactosidase staining is used to quantify remaining senescent cancer cells following treatment. Live cell imaging is used to view the mechanism leading to cell death. Cancer cells genetically engineered to express mClover-fused H2B allow the visualization of mitosis and cell divisions, to identify cell death modalities. Immunoblotting is used to test for biomarkers specific for the different cell death mechanisms. Results:We were able to quantify drug efficiency using a software protocol developed to detect the count of senescent cells after fixation and staining. Our data indicated that the combined treatment of Wee1 and Myt1 inhibitors, specifically the DEBIO-0123 and RP6306 treatment was the most effective senolytic agent, killing 60% of IR induced senescent cancer cells. Preliminary data from live cell imaging suggested that the cell death mechanism occurs due to mitotic catastrophe, likely as an attempt to go through mitosis with unrepaired DNA damage. Identification of the particular modality of cell death is ongoing. Conclusion:Combining inhibitors of both Wee1 and Myt1 has the potential to eradicate cancer cells surviving radiation therapy by undergoing senescence. Senolytic agents administered following radiation therapy to breast cancer patients could lead to a significant reduction in cancer recurrence.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 299
Presenter: Rebecca Reif
Supervisor: Hemmings, Denise G
Title: Identification of novel chondroitin sulfate proteoglycans in the placenta as receptors for Plasmodium falciparum infected red blood cells
Authors: Rebecca Reif, Melisa Gualdron-Lopez, Stephanie K. Yanow, Denise Hemmings

Theme: Pregnancy and developmental trajectories

Introduction: Placental malaria occurs when P. falciparum infected red blood cells (iRBCs) sequester in the placenta, leading to adverse health outcomes for the mother and fetus. The maternofetal interface of the placenta is the syncytiotrophoblast (ST); it comprises the outer cell layer of the fetal villi and is in direct contact with maternal blood. The villi project into the intervillous space (IVS) which contains a matrix - comprised of various proteoglycans - and the maternal blood. Sequestration of iRBCs occurs mainly in the IVS. This is facilitated by the binding of VAR2CSA, a parasite antigen found on the surface of iRBC, to chondroitin sulfate proteoglycans (CSPGs) on the placenta. VAR2CSA preferentially adheres to 4-O-sulfations (C4S) on CSA - which is unique to the placenta. One of these CSPGs is SDC-1 and is expressed by the ST. Previous studies demonstrated that other CSPGs interact with a recombinant form of VAR2CSA. One of these proteoglycans is glypican-3, which is expressed >400X higher in the placenta than other organs. Both extracellular domains of SDC-1 and glypican-3 can be enzymatically cleaved and have been measured in maternal serum; however, the protein levels have yet to be quantified in the IVS. We hypothesized that SDC-1, glypican-3 and other CSPGs with C4S-CSA in the IVS may bind VAR2CSA-expressing iRBCs, and this could be a mechanism of iRBC sequestration in placental malaria. Methods: Anti-C4S or control IgG antibodies were conjugated to dynabeads and used to immunoprecipitate CSPGs from a purified placental IVS sample. The bound proteins from each treatment were analysed by mass spectrometry. Human term placentas were collected, and biopsies were taken with the IVS preserved for immunofluorescent imaging. We performed immunofluorescence staining of placenta sections using a Zeiss AxioScan.Z1 to quantify glypican-3, SDC-1 and C4S expression on the ST and the IVS. Results: High levels of C4S were found in the IVS; however, co-localization with SDC-1 was low. Thus, we did immunoprecipitation of purified IVS to look for other CSPG candidates. Of the 690 proteins identified by mass spectrometry, 49 proteins were enriched by C4S. Of these proteins, our top candidate list that have CS glycosylations includes: glypican-3, biglycan, and collagen alpha-1(XV) chain. Glypican-3 and SDC-1 localized to the ST and the IVS in placental tissue (n=9-11). The expression level of glypican-3 on the ST was significantly higher than in the IVS (p=0.025, n=11). There were no significant differences in the expression level of SDC-1 in the ST compared to the IVS. This indicates that SDC-1 may be cleaved at higher levels than glypican-3 (p=0.87, n=9). Conclusion: We identified glypican-3 as a C4S-CSA proteoglycan in the IVS. SDC-1 and glypican-3 are expressed on the surface of the ST, which is consistent with previous findings. The adhesion of iRBCs to cleaved SDC-1 and glypican-3 in the IVS could be a novel mechanism of sequestration in placental malaria infections. Future investigations are needed to determine whether VAR2CSA-expressing iRBCs can bind to glypican-3. The identification of other proteoglycans that iRBCs can bind to will be important for development of therapeutics to prevent placental malaria.

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Participant #: 300
Presenter: Keshav Gopal
Supervisor: Ussher, John Edward
Title: Loss of ovarian hormones unmasks cardiac dysfunction in an experimental female mouse model of diabetic cardiomyopathy
Authors: Keshav Gopal, Christina T. Saed, Jordan S. F. Chan, Raven Kirschenman, M Toni E. Dimaano, Faina Benyaminov, Amanda A. Greenwell, Seyed Amirhossein Tabatabaei Dakhili, Kunyan Yang, Shahad Al-Imarah, Farah Eaton, Rami Al Batran, Sandra T. Davidge, John R. U

Theme: Lifelong women's health

Introduction: Obesity is a major risk factor for type 2 diabetes (T2D) and related cardiovascular diseases such as diabetic cardiomyopathy (DbCM), which is often asymptomatic during the early stages of T2D. Women at younger ages show a reduced incidence of both T2D and DbCM, but these inequalities disappear in postmenopausal women versus age-matched men. Unfortunately, experimental models of prediabetes or T2D often do not produce any notable cardiac dysfunction in female mice. Therefore, our aim was to evaluate the role of ovarian hormones in regulating cardiac function in female mice subjected to experimental T2D, and to characterize potential mechanisms that may account for any observed cardiovascular phenotypes. Methods: Female C57BL/6J mice with sham or ovariectomy (OVX) surgery were subjected to experimental T2D (high-fat diet [60% kcal from lard] for 12-wks with streptozotocin [75 mg/kg] administered at 4-wks). Lean non-diabetic female mice were fed a standard chow low-fat diet for an equivalent duration. Body weight, glucose homeostasis, and in vivo cardiac function were serially assessed throughout the protocol. At study completion, mice were euthanized, following which the heart and other tissues were extracted and evaluated for biochemical analysis. Results: Both sham and OVX mice subjected to experimental T2D exhibited increases in body weight, blood glucose levels, and glucose intolerance, though these increases were more prominent in OVX than sham when compared to their lean counterparts. However, only OVX mice displayed the cardiac abnormalities present in DbCM, including diastolic dysfunction as reflected by a significant decrease in the tissue Doppler e'/a' ratio and an increase in E/e' ratio. Furthermore, we observed no changes in parameters of systolic function in comparison to lean mice. Cardiac tissue from OVX mice with T2D demonstrated several changes in the gene expression of key regulators of cardiac energy metabolism. This includes increased expression of peroxisome proliferator activated receptor alpha (Ppara), pyruvate dehydrogenase kinase 4 (Pdk4), medium chain acyl CoA dehydrogenase (Acadm), and beta-hydroxybutyrate dehydrogenase (Bdh1). These changes are suggestive of decreases in glucose oxidation and increases in fatty acid and ketone body oxidation, mirroring the cardiac metabolic abnormalities that have been observed in male mice subjected to experimental DbCM. Conclusions: Our data suggest that the protection observed in female mice against experimental DbCM may be mediated by favorable actions of ovarian hormones on cardiac energy metabolism. Hence, future studies are needed to better define the potential contribution of various ovarian hormones such as estrogen to cardiac energy metabolism in females with T2D.

This research has been funded by the Alberta Women’s Health Foundation through the Women and Children’s Health Research Institute.

Participant #: 301
Presenter: Osnat Wine
Supervisor: Hicks, Matt
Title: Can the science of team science inform implementation projects? Supporting team building to facilitate implementation
Authors: Osnat Wine and Matt Hicks

Theme: Pregnancy and developmental trajectories

Introduction NASCENT is an implementation project supporting change in care practices for mothers involved with substance use in pregnancy and their infants. Implementation in this context is complex and challenging, requiring a shift in established practices and culture. Care providers and stakeholders must be effectively brought together to collaborate, while considering their unique contexts. Collaborative implementation also requires building leadership competencies; promoting capacity building; mentor and facilitate learning; and, building a constructive environment for improved care for women and infants. Using the science of team science lens to study implementation science could provide unique insights on effective collaborations within and across sectors, especially, in the complex clinical context of substance use. Our aim is to define the nature of care teams in this context- who needs to be involved, how, and when; uncover the conditions and elements that facilitate or hinder effective and sustainable collaboration and engagement; and, inform the design of tailored site-specific strategies and team-based interventions to support the implementation process and uptake. Here we describe preliminary findings and identified challenges. Methods A qualitative case study explores the perceptions of parents, care providers, and stakeholders who provide care for mothers involved in substance use and their babies. The study includes a formative evaluation using questionnaires, documents, observations, focus groups, and interviews, informed by collaborative research principles and the Consolidated Framework for Implementation Research. Results Identifying the nature and membership boundaries of implementation teams in the context of healthcare is challenging. Preliminary findings identified that efficient implementation was reliant on a dedicated, committed, passionate small core team, and management support. However, the implementation team is defined by the care pathways patients receive and thus, extends to a broad variety of practitioners within acute settings, as well as the pivotal buy-in and support of administration. There is also increasing understanding that patients, their families, and peer support are instrumental parts of the care team. Additionally, while this project focus is on intervention within hospitals, strong relationships and engagement with community organizations and services are crucial for the continuum of care and implementation success. Thus, a team may include researchers, various practitioners, care providers, administrators as well as community members. However, significant engagement in team building processes is challenging due to a stressful over-burdened environment. Discussion The definition of an implementation team in this context is elusive and boundaries and membership constantly change. Further exploration is required: Is the science of team science applicable for implementation teams in healthcare settings? Can the strategies used to support team engagement and efficient collaborative processes be utilized in the stressful over-burdened environment of health care?

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Participant #: 302
Presenter: Jad-Julian Rachid
Supervisor: Bourque, Stephane
Title: Analysis of late onset sepsis in neonatal rats through echocardiography
Authors: Jad-Julian Rachid, Si Ning Liu, Kimberly Macala, and Stephane Bourque

Theme: Children's health and well-being

Introduction: Late-Onset neonatal Sepsis (LOS) is a blood invasive bacterial infection that affects newborn within 72h of birth. It is a major contributor to morbidity and mortality in early life, affecting 36% of preterm infants (<28 weeks' gestation) and 32%-65% of low birthweight infants (<1000g). The heart is one of the major organs affected during sepsis, where metabolic disturbances, inflammation and eventual hypovolemia can impair cardiac function and cause lasting damage. However, how cardiac dysfunction manifests with the onset of LOS has not been characterized in a rat model. Here, we assessed cardiac function in the neonate using echocardiography in the acute phase following induction of abdominal sepsis. Methods: 3-day-old Sprague Dawley rat pups received an intraperitoneal injection of fecal slurry (FS, 1.0 mg/g body weight) or vehicle control (5% dextrose). A subcutaneous injection buprenorphine was given for pain control immediately after FS, and fluids and antibiotics were administered 4 hours post-induction. Echocardiography was performed at 8h post-FS using a Vevo 3100 system (Visualsonics, Toronto). To do this, pups were anesthetized with isoflurane (3% induction, 1.5% maintenance, flow rate 1mL/min in pure O2) and placed on heated physiological platform in a supine position; respiratory rate (and heart rate were monitored continuously throughout. All data collection and analysis were performed by an individual (JJR) blinded to treatment. Data were analyzed by 2-way ANOVA followed by Holm-Sidak post hoc test using Graphpad Prism (version 9.0). Results: Cardiac function was severely impaired in septic pups. FS reduced stroke volume by 66% in males ($P<0.0001$) and 72% in females ($P<0.0001$), resulting in a drop in cardiac output relative to body weight by approximately 75% in both sexes ($P<0.0001$). Notably, ejection fraction was increased in septic pups by ~35% in both sexes' ($P<0.0001$). Left ventricular internal diameter end-diastole was reduced in both male and female septic pups ($P<0.0001$). Diastolic dysfunction is also evident in septic neonates, characterized by early diastole doppler velocity ($P<0.0001$) resulting in an overall reduced E/A ratio ($P=0.0001$). Conclusion: Overall this suggests both a systolic and diastolic dysfunction within neonatal hearts as a result of vascular permeability. Future directions included the use antioxidant therapies to potentially protect and aid the heart in function.

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