UNDERGRADUATE SUMMER
RESEARCH SHOWCASE | **Abstracts**

2025

Contents

8

ANATOMY, PHYSIOLOGY & PHARMACOLOGY

1

Kaitland Fior
Maria Gagarinova
Aidan Hydomako
Kyle Luo
Jade Ong-Tone
Dylan Turner
McKenzie Byers
Katherine Chang

2

Aniela Hernandez
Jieni (Jennie) Gao
Jamila Jalilova
Halle Johnsen
Anna McCullough
Jay Patel
Yolanda Plaza
Thora Reynolds
Uday Sandhu

3

Joanne Zachariah
Ronin Sawitsky
Sierra Siedlecki
Reed Simonson
Shennan (Aaron) Su
Caleb White
Patrick Sarmiento
Chenkun (Steve) Zheng

Contents

Contents

Contents

C o n t e n t s

Contents

118

Mackenzie Enweani
Zainab Hassan
Areel Nasir
Adam Hussain
Jack Walther
Veronica Nguyen

A Message From The Vice-Dean

Dear Colleagues,

Welcome to the 2025 Virtual Undergraduate Summer Research Showcase.

This is the twentieth iteration of our undergraduate summer student research programming, which has grown to be a very important event in the University of Saskatchewan College of Medicine research calendar.

This year, we have poster submissions from 12 different biomedical and clinical research categories, for a total of 16 competition categories.

I am delighted to acknowledge the exceptional dedication and hard work of students, mentors, adjudicators and all who facilitated undergraduate student research programs. Our staff have worked incredibly hard to ensure all students gained the research experience they desired.

I wish all of us in our college yet another unforgettable research experience!

With kind regards,

Kaitland Fior (Dr. Michael Levin)

App is alternatively spliced in a model of neurodegeneration: implications for synaptic pathology in the pathogenesis of neurologic disease

Background: Dysfunction of the RNA binding protein heterogeneous nuclear ribonucleoprotein A1 (A1) occurs in neurodegenerative diseases, resulting in loss of RNA binding, alternative RNA splicing, and changes in synaptic biology. Both splicing changes and synapse dysfunction are central to neurodegenerative disease. We therefore hypothesize that A1 loss of function alters splicing of synaptic targets, a potential mechanism driving synaptic dysfunction in neurodegenerative disease.

Methods: Cultured primary neurons from Cas9/EGFP transgenic mice were transduced with viruses containing guide RNA targeting A1 (A1 knockout) and Rosa26 (control). Protein and RNA were collected at 10 and 14 days in vitro (DIV). Immunocytochemistry and western blotting were used to confirm A1 knockout. RT-PCR and DNA gel electrophoresis were used to investigate splicing of synapse-related RNA targets.

Results: Knockout was confirmed with >97% decrease in A1 expression compared to control neurons ($p<0.01$, paired t-test). Alternative splicing analysis showed no significant difference of synaptic targets, Stmn4, Homer-1, and Syngap1 following A1 knockout. Importantly, there was a change in App splicing at 10DIV and 14DIV ($p<0.05$, paired t-test).

Conclusion: Considering the critical role that App plays in synapse biology, these results suggest that loss of A1 function precipitates abnormal App alternative RNA splicing, which may contribute to synaptopathology in neurologic disease.

Maria Gagarinova (Dr. Andrea Lavoie)

Sex Differences in SGLT2 Inhibitor Prescription Trends for Heart Failure with Reduced Ejection Fraction: A Population-Based Retrospective Cohort Study in Saskatchewan

Patients who have been prescribed SGLT2 inhibitors for heart failure have significantly better prognoses, having a lower risk of cardiovascular hospitalization and death. However, they are prescribed less often for female compared male heart failure patients. This researched aimed to evaluate local sex-differences in SGLT2 inhibitor prescription of hospitalized heart failure patients with low ejection fractions between 2022 and 2024 through chart review and subsequent data analysis with regression modelling. Analysis revealed that there were no significant sex-differences in SGLT2 inhibitor prescription, although its prescription did tend to increase each year in both groups. Additionally, while there were no significant sex-differences in any of the comorbidities, the interaction between diabetes and whether an SGLT2 inhibitor was prescribed is predictive of patient sex in regression modelling. Finally, there were significant sex-differences in the hemoglobin and eGFR laboratory analyses, with female patients having lower values compared to male patients. These results demonstrate the local implementation of guideline-directed medical therapy and how prescription has changed over the years.

Aidan Hydomako (Dr. Michael Kelly)

Quantification of Post-Stroke Cerebral Edema via Measurement of Neuroanatomical Displacement

Cerebral edema is a life-threatening complication of ischemic stroke, often leading to elevated intracranial pressure and poor neurological outcomes. Neuroanatomical measurements, such as midline shift, serve as clinical indicators of edema severity that guide management decisions. Treatments targeting the molecular mechanisms of cerebral edema following ischemic stroke are limited, underscoring the need for further preclinical research. In mouse models, edema is typically quantified by tissue desiccation to determine brain water content, which precludes additional analysis of the ischemic tissue using advanced imaging techniques. We hypothesized that post-stroke cerebral edema in a mouse model of ischemic stroke can be indirectly quantified through relative measurements of neuroanatomical displacement. We assessed hemispheric cross-sectional area (CSA) ratio and midline shift (MLS) in the coronal plane as candidate metrics for edema severity. Hemispheric CSA ratio appeared to be a more objective and promising measure than MLS in our middle cerebral artery occlusion (MCAO) model, although neither measurement significantly correlated with brain water content. Our analysis was limited by a low rate of MCAO-induced ischemic changes (22%) and a high rate of hemorrhagic complications (44%). Repeat MCAO experiments are required to further evaluate the utility of these measurements for quantifying post-stroke cerebral edema.

Kyle Luo (Dr. Valerie Verge)

Alterations in Luman/CREB3 and adaptive ER stress response expression induced by Acute Intermittent Hypoxia in injured sensory neurons

Luman/CREB3 has previously been shown to regulate the capacity of injured sensory neurons to regenerate an axon via the unfolded protein response (UPR). A low level activation of UPR is considered beneficial adaptive stress in peripheral neurons undergoing axonal regeneration. Additionally, we have also shown that Acute Intermittent Hypoxia (AIH) enhances peripheral nerve regeneration via a presumably beneficial adaptive stress response. Thus, we hypothesize that "injured sensory neurons exposed to AIH therapy mount an increased beneficial adaptive stress response where Luman/CREB3 and elements of the UPR are co-regulated". The purpose of this study is to provide preliminary insight into how Luman and UPR elements, such as GRP78, CHOP, ATF6, and SREBP1 expression are altered in sensory neurons under AIH and normoxia conditions in response to unilateral 4d or 7d sciatic nerve crush injury. During the study, AIH and normoxia treated rat dorsal root ganglia at the L4 and L5 levels were cryosectioned and processed using immunofluorescence histochemistry, photographed and qualitatively analyzed. Preliminary findings reveal that AIH induces an increase in Luman and UPR marker expression in injured sensory neurons, suggesting that the elevated expression of UPR may indeed aid in the enhanced axonal regeneration observed with AIH treatment.

Jade Ong-Tone (Dr. Heather Szabo-Rogers)

Prevalence of Craniofacial Birth Defects in Saskatchewan

Saskatchewan has one of the highest rates of orofacial clefts within Canada, however there is limited information pertaining to genetic variants and environmental toxins that contribute to its high rate. The most common craniofacial birth defect is orofacial clefts which include cleft lip and palate (CLP). These clefts occur in 4-5% of births. This project is a retrospective case review which analyzed the charts of individuals with craniofacial anomalies seen by the Medical Genetics Clinic at the Royal University Hospital in Saskatoon from 2014-2024. Health information retrieved included demographics, family history, type of craniofacial anomaly, and genetics test results. Over 240 patients were included in this study with 181 individuals with CLP. Genetic test results identified over 130 variants of unknown significance (VUS). Additionally, three families had the same VUS identified in two or more of their family members. Further data from various genetics clinics across Saskatchewan is warranted to determine an accurate prevalence of craniofacial birth defects, and further testing warranted to determine the role of these VUS in the development of craniofacial defects.

Dylan Turner (Dr. Payam Dehghani)

Sex-specific outcomes of patients with aortic stenosis following transcatheter aortic valve implantation (TAVI): Implications of hemodynamic parameters

Outcomes in patients undergoing transcatheter aortic valve implantation (TAVI) are known to vary by sex. To understand if hemodynamics are associated with outcomes, a retrospective chart review was conducted on 98 patients undergoing TAVI at Regina General Hospital between 2020–2023 (n=46 women). Patients with valve-in-valve TAVI and prior surgical aortic valve replacement were excluded. Comorbidities and hemodynamics were collected. Univariable logistic regression models associated hemodynamics to mortality and hospital readmission within 30-days, one, and two years. Women had higher mean (42.0 vs. 33.0 mmHg, p=0.018) and peak gradients (51.3 vs. 40.3 mmHg, p=0.029), and larger indexed aortic valve area (0.83 vs. 0.42 cm²/m², p=0.013). Agaston scores were 2809.52 +/- 993.83 for men and 2011.65 +/- 935.47 for women (p<0.05). Readmission within 2 years may be associated to myocardial infarction (p=0.08) and cancer (p=0.034) in men; age (p=0.018) and respiratory disease (p=0.045) in women. Two-year mortality for men may be associated with age (95% CI 0.67 - 0.95; p=0.018) and history of cerebrovascular events (95% CI 1.21 – 74.93; p=0.03). Mortality rates did not differ. Limitations include retrospective design, small sample, and potential bias. Sex-based hemodynamic differences may relate to TAVI outcomes and require future investigation.

McKenzie Byers (Dr. Michelle Collins)

*PITX2C Transcriptionally Regulates Metabolic Gene Expression*

Atrial fibrillation affects approximately 1-2% of the Canadian population and has been strongly associated with SNPs near the PITX2 locus on chromosome 4q25.[1,2] PITX2C encodes a transcription factor known for regulating left-right asymmetry within neonatal heart development.[3] During the first week of postnatal development, a metabolic switch from glycolysis to fatty acid oxidation occurs leading to changes in cardiomyocyte proliferation and binucleation. [4] We hypothesize that the loss of PITX2C impairs neonatal rat atrial cardiomyocyte (NRAM) maturation by disrupting the expression of metabolic genes during the neonatal period. To test this, we transfected NRAMs with 100 nm of a control siRNA or a siRNA targeted to knockdown Pitx2c (548 siRNA)., 48-hours later, these cells where either stained for immunofluorescence or sent for RNA sequencing. NRAM maturation was assessed using a phospho-histone H3 (pH3) antibody, DAPI and cTnT, then analyzed for proliferation and binucleation in knockdowns compared to controls. Metabolic gene expression was assessed through RNA sequencing and analyzed using Ingenuity Pathway Analysis. Our results demonstrate that the loss of PITX2C does not significantly alter proliferation or binucleation in NRAMs at postnatal day 2, however does impact regulation of metabolic and biosynthetic pathway genes.

Katherine Chang (Dr. Justin Botterill)

ITRAPing hippocampal neurons involved in fear learning and memory

Contextual fear conditioning is used to study learning and memory in rodents. While previous studies suggest that the hippocampus is important for contextual fear memories, the brain circuits involved in encoding and retrieving fear memories are not fully understood. Here, we used TRAP2xtdTomato mice to investigate freezing behaviour and neuron activation after foot shocks. Mice were placed in a fear conditioning chamber and administered foot shocks. 14 days later, mice were placed in the original training environment without foot shocks. Fear memory retrieval was assessed by time spent freezing. Semi-automatic cell counting scripts were used to quantify the cells involved in encoding, retrieval and both timepoints. Foot shocks significantly increased the density of neurons (cells/mm^2) activated during encoding and both timepoints compared to control mice in the granule cell layer, CA3, and CA1. Foot shocks did not significantly increase the density of neurons activated during retrieval compared to control mice. Results suggest the hippocampus is involved in fear memory encoding. Moreover, results suggest the retrieval of encoded fear memories does not increase total neuron activation but rather, a greater proportion of neurons activated during retrieval will be neurons involved in encoding fear memories compared to control mice.
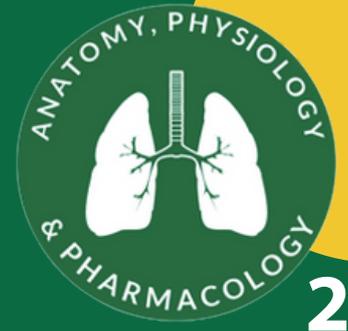
Aniela Hernandez (Dr. Sebastian Gauvrit)

Developing Tools to Investigate VEGFA Signaling in Brain Vascular Development

 he central nervous system (CNS) relies on a tightly regulated vascular network to support its development, maintain its homeostasis, and respond to disease. Blood vessels, lined with endothelial cells, deliver oxygen and nutrients to the brain. Vascular endothelial growth factor A (VEGFA) is the main growth factor necessary for vascular development, and its function is conserved in zebrafish. VEGFA signalling regulates endothelial cell differentiation, proliferation, and migration. VEGFA blockers are used in clinical settings to treat cancer and hypervascularization conditions.

This project aimed to establish tools to study VEGFA signalling during zebrafish brain vascular development. We used a new genome editing technique, CRISPR/Cas9 based mutagenesis tool kit, to simultaneously generate a reporter of vegfa and disrupt its expression. We observed the expression pattern of the fluorescent reporter in the trunk, somites, and occasionally the head, recapitulating its known endogenous expression. Whole mount vegfa immunostaining indicate expression primarily in the head region, while immunostaining of adult brain sections didn't show a specific signal. Finally, we characterized a glut1b antibody specific to brain blood vessels, enabling future investigation of vegfa inhibition. Together, this work establishes foundational tools and validate zebrafish as a practical model for studying VEGFA signaling in brain vascular development.

Jieni (Jennie) Gao (Dr. Asmahan AbuArish)

Investigating Stress Granule Formation in Macrophages in Response to Cigarette Smoke Extract Exposure

Cigarette smoke exposure is a major contributor to chronic inflammatory lung diseases such as chronic obstructive pulmonary disease (COPD), in which pulmonary macrophages are an important line of defense against inhaled toxins. While some studies suggest cigarette smoke extract (CSE) promotes inflammasome activation, others indicate inhibition, leaving CSE effects uncertain. It has been shown in Dr. AbuArish's lab that CSE exposure induces stress granule (SG) formation, cytoplasmic aggregates of RNA and protein, but the pathway responsible requires determination. Here, we investigate whether CSE exposure induces SG formation via the activation of the Integrated Stress Response (ISR) pathway and whether inflammasomes form. Upon exposing THP-1 cells to CSE, immunofluorescence imaging demonstrates G3BP1(SG marker) clustering, indicating SG formation, and p-eIF2α elevation, indicating ISR activation. SG formation was inhibited by NAC, GSK, and ISRIB (ISR inhibitors). Furthermore, CSE exposure induced inflammasome proteins sequestration inside SGs, evidenced by co-localization of GSDMD and Caspase-1 inside G3BP1 clusters. These findings suggest that SGs form in macrophages in response to CSE and sequester inflammasome components, revealing a potential regulatory mechanism between the two stress pathways. Future work will determine whether inflammasome proteins sequestration inhibits or facilitates inflammasome formation, providing insight into therapeutic strategies for smoke-induced pulmonary inflammation.

Jamila Jalilova (Dr. Justin Botterill)

Controlling epileptiform activity through the supramammilary-hippocampal circuit in slice model of epilepsy

Epilepsy affects 1–2% of the population, and about one-third of patients are resistant to current medication. The most common drug-resistant form, temporal lobe epilepsy (TLE), is closely linked to hippocampal dysfunction. The supramammillary nucleus (SuM) regulates hippocampal circuits via projections to the dentate gyrus (DG) and CA2, and growing evidence implicates this pathway in seizure generation. Understanding how SuM inputs dynamically shape hippocampal excitability may provide new insights into the network mechanisms underlying TLE. Based on preliminary data, we hypothesize that SuM inputs drive hippocampal hyperexcitability in TLE. We predict that optogenetic activation of SuM projections will increase epileptiform activity, whereas inhibition will suppress it. To test this, we use cell-type–specific viral delivery of excitatory (oChiEF) and inhibitory (ArchT) opsins in VGluT2-Cre mice, combined with acute hippocampal slice recordings under pro-epileptic conditions. Our results demonstrate that OChiEF-mediated optogenetic stimulation of SuM axonal projections to the DG and CA3 can enhance epileptiform activity in a slice model of epilepsy. ArchT-mediated optostimulation was not effective during ongoing epileptiform activity, but when applied prior to the onset of epileptiform events, it altered hippocampal plasticity and subsequently reduced epileptiform activity in slices.

Halle Johnsen (Dr. Michelle Collins)

TRPML Calcium Channel Agonists Influence Heart Rate in Zebrafish Larvae

It is well accepted that calcium release from the main calcium store in the cell, the sarcoplasmic reticulum (SR), is required for cardiac muscle to contract. Beyond the SR, the endolysosomal compartments are emerging as potent calcium stores. The main calcium efflux channel in the endolysosomes is the Transient Receptor Potential Mucolipin (TRPML) channels TRPML1-3. The calcium from these stores may influence the calcium release from the SR. Thus, I hypothesize that endolysosomal TRPML channels contribute to calcium handling to regulate cardiac contractility and rhythm. To activate these channels, Mucolipin Synthetic Agonist 1 (ML-SA1), a more nonselective agonist, and 5 (ML-SA5), the more selective agonist, were used to pharmacologically induce calcium efflux in the developing zebrafish. Heart rate, heart rhythm, and contractility were measured through live imaging of beating larval hearts. ML-SA1 treatment reduced heart rate, while ML-SA5 elicited a biphasic response, characterized by an initial increase in heart rate, followed by a decrease at higher concentrations. Both agonists also induced valve defects and ventricular hypercontractility. The valve defects may suggest a developmental sensitivity to the increased calcium efflux, while the hypercontractility shows a potentially altered threshold for contraction.

Anna McCullough (Dr. Michael Wu)

Assessment of rRNA biosynthesis in histone mRNA 3' post-transcriptional processing in Caenorhabditis elegans

Histones are proteins within eukaryotic organisms, essential for the proper storage of DNA. Histone mRNA is cleaved at the 3' end following transcription, a process necessary for genomic stability. Misprocessing of histones can result in genomic instability, which can contribute to diseases such as developmental defects, aging, and cancer. Despite its importance, the molecular requirements for proper histone mRNA processing remain poorly understood. To investigate mechanisms within ribosomal RNA (rRNA) biosynthesis that contribute to misprocessing, we selectively disrupted rRNA processing in Caenorhabditis elegans using a pharmacological approach and RNA interference (RNAi). Varying concentrations of Actinomycin D, a transcription inhibitor, and Cycloheximide, a translation inhibitor, were administered for the pharmacological trials, and transcripts encoding 5.8S, 18S, and 26S were knocked down with RNAi. Trials of Actinomycin D showed strong activation of a GFP based histone misprocessing reporter, and these results were confirmed and quantified by qPCR, indicating the drug induces histone misprocessing. Furthermore, RNAi trials exhibited mild GFP activation, which once verified by qPCR could demonstrate the importance of individual rRNA in creating properly processed histones. These findings demonstrate that ribosomal pathways are a key component in histone processing and genomic stability, which could implicate these sites as potential therapeutic targets.

Jay Patel (Dr. Anand Krishnan)

Developing a Bio-ID method for elucidating the interactome of Mesencephalic Astrocyte-Derived Neurotrophic Factor (MANF)

Bio-ID is a technique that utilizes biotin ligase enzyme to biotinylate proteins that are in close proximity to a target protein, allowing the detection of transient protein-protein interactions. Mesencephalic Astrocyte-Derived Neurotrophic Factor (MANF) is a neurotrophic factor that has been studied for its growth-promoting properties in the peripheral nervous system (PNS). However, the receptor and the interactome of MANF have not been identified.

In this study, we developed a Bio-ID protocol to study MANF's interactome. We generated lentiviruses that carry Dox-inducible biotin ligase BirA (L-Dox-BirA) and MANF-BirA (L-Dox-MANFBirA). They were transduced in rat primary Schwann cells. Stably transduced cells were selected with puromycin, and gene expression was induced by Doxycycline supplementation.

Immunostaining and western blot experiments confirmed the expression of BirA and MANF-BirA in these cells. We then supplemented biotin to the cells to biotinylate proteins closely associated with MANF. BirA mediated biotinylation was also confirmed using fluorescence staining and western blot. Finally, the biotinylated proteins were pulled down using streptavidin coated beads for LC-MS/MS analysis and detection of MANF's interactome. Overall, this study developed a protocol and generated sufficient samples for Bio-ID-based elucidation of MANF's interactome.

Yolanda Plaza (Dr. Changiz Taghibiglou)

Effects of SREBP-1 Lipid Transcription Factor Inhibition Using UDPG on Glioblastoma Cells

Glioblastoma multiforme (GBM) are one of the most aggressive brain malignancies and is associated with dysregulated lipid metabolism, specifically the overexpression of Sterol Regulatory Element-Binding Protein-1 (SREBP-1), which is a key transcription factor in lipid regulation. This study investigates the effects of inhibiting SREBP-1 using Uridine Diphosphate Glucose (UDPG) in T98G GBM cell lines. UDPG has been reported to inhibit Site-1 protease, one of the two proteases required for SREBP-1 activation. T98G cells were treated with increasing concentrations of UDPG over a 3-day period. Cells were then collected and analyzed for cytotoxicity, cell migration and protein expression using lactate dehydrogenase (LDH) assay, scratch assay, and Western blotting. Results demonstrated that UDPG induced significant cytotoxic effects in a time- and concentration-dependent manner and reduced cell migration. Additionally, UDPG preserved premature SREBP-1, thereby reducing activation of mature SREBP-1 and downstream targets. These findings suggest that UDPG effectively inhibits SREBP-1 activation and exerts both cytotoxic and anti-migratory effects in glioblastoma cells. GBM are known to be resistant to chemotherapy and radiation, making them particularly difficult to treat. Despite the available treatment options, glioblastomas tend to recur after aggressive therapy, underscoring the need for novel therapeutic approaches that can overcome the challenges associated with treating GBM.

Thora Reynolds (Dr. Valerie Verge)

*Is Luman Linked to AIH-Induced Beneficial Adaptive Stress Responses in the EAE Model of MS?*

We find that Acute Intermittent Hypoxia (AIH), a novel non-invasive therapy, reduces disease severity and promotes repair in the EAE mouse model of MS. However, the mechanism(s) are largely unknown. The Unfolded Protein Response (UPR), triggered by ER stress, is activated in MS and the EAE model, and if adaptive, can promote a beneficial stress response. Luman/CREB3, a major UPR regulator in nerve repair, has also been shown by the Verge lab to play a role in oligodendrocyte survival and myelination capacity. Thus, we hypothesized that "AIH treatment may promote a beneficial adaptive stress response by increasing expression of Luman relative to Normoxia controls". Using the EAE model, mice were given either AIH or Normoxia treatment once daily for 7d after reaching near peak disease. Luman expression was examined within the ventral lumbar spinal cord white matter tracts at end of treatment using immunofluorescence analysis. We observed that AIH increased Luman expression within regions of inflammation and in reactive microglia/macrophages. However, although significantly increased over the Naïve state, no change was observed in axons or astrocytes relative to Normoxia. This suggests a potential role for Luman and the UPR in the beneficial outcomes of AIH, which will guide future experiments.

Uday Sandhu (Dr. Changting Xiao)

Developing a Protocol for Isolating Extracellular Vesicles from Lymph Fluid

Extracellular vesicles (EVs) are bi-layered particles responsible for important physiological functions. Their link to metabolism and their exciting potential applications in medicine have sparked recent interest. This interest has necessitated protocols to be established for their isolation and study. The goal of this project is to develop an effective method for the isolation of EVs from gut-derived lymph fluid, specifically evaluating ultracentrifugation (UC) as an isolation method. Lymph was collected from the mesenteric lymph duct (MLD) of Sprague-Dawley rats before and after they had received either an Intralipid or a Saline load of 1.5 millilitres. The lymph was then centrifuged at 2,500g for 10 minutes to remove cells and debris. This cell-free lymph was centrifuged twice at 20,000g for 20 minutes, and separated into two fractions: chylomicron (upper layer) and chylomicron-free (lower layer). Finally, the chylomicron-free sample was ultracentrifuged twice at 100,000g for 90 minutes to purify the EVs. To assess the purification, parameters such as TG concentration and fluorescence of CD9, CD63, and CD81 antibodies are measured. Additionally, transmission electron microscopy (TEM) analysis allows for visualization of EV purification. This project found that centrifugation and ultracentrifugation can effectively enrich EVs in lymph fluid.
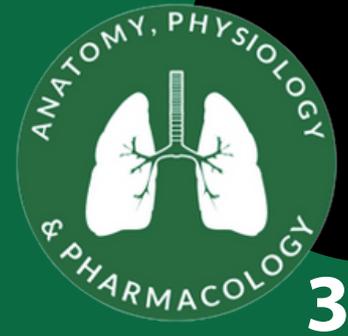
Joanna Zachariah (Dr. Heather Szabo-Rogers)

Mutations in Prickle1 affect Hedgehog signaling and Protein Kinase A

Embryonic facial development involves the fusion of paired facial prominences, including the medial nasal prominences (mnp). Disrupted fusion of the mnp can lead to midfacial clefts, where structures including the nasal septum and upper lip are affected. However, less is known about the mechanisms underlying midfacial clefting. Our lab uses the Prickle1Beetlejuice (Prickle1Bj) mouse line to model midfacial clefts. Prickle1Bj/Bj have a mutation in the Prickle1 protein of the Wnt/Planar cell polarity pathway, and develop wider faces and midline cleft lip.

An important signaling pathway during facial development is the Hedgehog (HH) pathway, which functions through the primary cilium. A key protein involved in the pathway is Protein Kinase A (PKA), which is involved in the proteolytic processing of the Gli transcription factors that regulate HH signaling. We previously observed ~50% decrease in PKA-positive primary cilia in the Prickle1Bj/Bj mnp.

We performed insitu hybridization and observed an expanded domain of the HH signaling ligand, Sonic hedgehog (Shh) in the midface, suggesting increased activation of HH signaling. We showed using western blotting that HH induces Gli3 activation in the Prickle1Bj/Bj cells, and that increasing PKA activity using forskolin can decrease Gli3 activation. We also showed decreased relative mRNA expression of HH targets Gli1 and Ptch1 using qPCR, suggesting that forskolin treatment can decrease HH signaling in the Prickle1Bj/Bj cells.
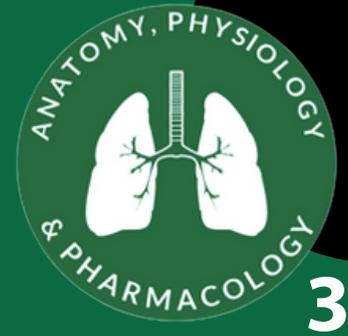
Ronin Sawitsky (Dr. John Howland)

Dopamine Dynamics in the Nucleus Accumbens During the Odour Span Task for Working Memory

Dopamine is a neurotransmitter traditionally associated with reward, but it also plays a significant role in motivation and encoding the salience of memories. In particular, working memory—the active process of temporarily holding and manipulating information—has been implicated in dopamine dynamics in the nucleus accumbens (NAc), a brain area involved in motivated behaviours. To further investigate the role of dopamine and the NAc in working memory, we injected a viral vector encoding the dopamine sensor GRAB-DA3m into the NAc of Long-Evans rats, and implanted fiber-optic probes for fiber photometry. This allowed us to measure changes in dopamine release during behaviour trials, which we verified with salient stimuli and reward delivery. Rats were then trained on delay non-match to sample (DNMS) and the odor span task (OST), two odor-based working memory tasks. DNMS requires rats to identify a novel odor after a delay, and OST increases the cognitive load by adding additional odors to remember. Photometry recordings during DNMS revealed that dopamine activity remained near baseline during sample and correct choice trials but decreased significantly during incorrect trials. Ongoing work will apply this methodology to investigate how dopamine dynamics adapt under a higher cognitive load in the OST.
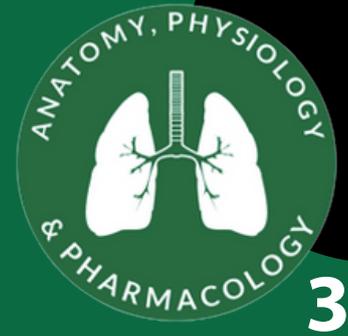
Sierra Siedlecki (Dr. Scott Widenmaier)

Monounsaturated Fats Protect Against Cholesterol Crystals in Cultured Liver Cells

Metabolic dysfunction associated steatotic liver disease (MASLD) involves fat accumulation in the liver and can progress to the more severe state of metabolic dysfunction associated steatohepatitis (MASH). This progression is partly due to excess cholesterol precipitating into crystals, which are thought to trigger liver inflammation. Recent findings in our lab suggest liver crystals are composed of cholesteryl ester. However, the influence of fatty acid saturation on crystal formation remains unclear. We hypothesized that monounsaturated fatty acids reduce cholesterol crystallization in hepatocytes. To investigate, Hep3B cells were incubated for 48 hours following cholesterol loading and treatment with oleic acid or palmitoleic acid. At endpoint, cells were analyzed via fluorescence and polarized light microscopy. Statistical analysis was conducted using GraphPad Prism. Both fatty acids significantly reduced crystal formation and were associated with increased lipid droplet size, area, and number. This expansion of droplets inversely correlated with crystal burden, suggesting that monounsaturated fatty acids promote cholesterol solubilization within droplets and thereby prevent crystal formation. These findings indicate that fatty acid saturation can modulate hepatic cholesterol crystallization, providing a mechanistic basis for the hepatoprotective effects of monounsaturated fatty acid-enriched diets. Additionally, lipid droplet remodelling represents a potential strategy to mitigate cholesterol crystal-driven liver injury.
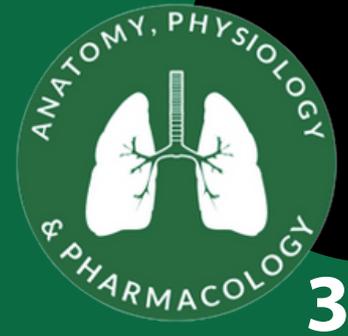
Reed Simonson (Dr. Michael Levin)

Evaluating the impact of Multiple Sclerosis patient-derived hnRNP A1 mutations on protein mislocalization and neuronal morphology

Heterogenous nuclear ribonucleoprotein A1 (A1) is an RNA-binding protein that is a potential cause of progressive neurodegeneration in multiple sclerosis (MS). A1's mislocalization from the neuronal nucleus to cytoplasm has been linked to neurodegeneration. We hypothesized that A1 mislocalization would cause a neurogenerative phenotype in a neuronal cell line. This was tested using Neuro-2a-Cas9 cells, a neuronal cell line containing CRISPR-Cas9 to knock out endogenous A1 and introducing either wildtype (control) or MS patient-derived mutant A1 tagged with mCherry. The MS mutations led to significantly higher percentage of A1 in the neuronal cytoplasm, with levels of A1 mislocalization in mutants increasing over 50% on average with the most severe construct increasing by 79% ($p<0.001$). Analysis of neurite length showed that mutations led to significantly decreased neurite length compared to wildtype, with neurite length decreasing over 35% on average in the mutants ($p<0.001$). These results suggest that the expression of MS patient-derived A1 mutants induces a neurodegenerative cellular phenotype, characterized by A1 nucleocytoplasmic mislocalization and decreased neurite length. This implicates A1 dysfunction in the pathogenesis of neurodegeneration in MS and provides future avenues to explore the mechanisms that underlie disease progression.
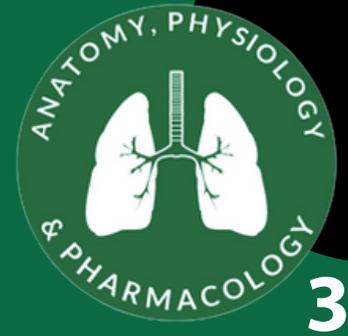
Shennan (Aaron) Su (Dr. Scott Widenmaier)

Disruption of Lipid Metabolism Underlies Sepsis Pathology

Sepsis is a dysregulated immune response to infection that can lead to multi-organ failure and is the leading cause of death for patients in intensive care units. Emerging evidence suggests that lipid metabolism plays an important role in host defense during sepsis, offering potential therapeutic areas for sepsis treatment. In this project, we hypothesize that sepsis contributes to pathological outcomes and worsens survival outcomes by disrupting lipid metabolism.

To investigate this, C57BL/6J mice were subjected to sepsis, and liver tissue and blood were collected for lipid analysis. To assess the impact of impaired lipid clearance and dietary fat, LDL receptor (LDLR)-deficient mice were fed a high-fat diet for 7 days prior to sepsis induction. Survival was monitored over 72 hours.

Results show deviations in lipid profiles between septic and non-septic mice, indicating that sepsis disrupts lipid metabolism in the murine model. Wild-type mice fed a high-fat diet prior to sepsis induction showed a marked increase in mortality. This effect was further exacerbated in LDLR-deficient mice on the same diet, suggesting a synergistic interaction between dietary factors and the absence of functional LDLR. Future investigations will focus on characterizing changes in lipoprotein composition and function during sepsis.
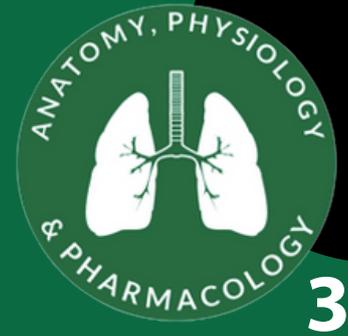
Caleb White (Dr. John Howland)

Using machine learning to enhance a rodent behavioural test for screening pharmacological effects on memory

Novel object recognition (NOR) tests are used to test behaviour and infer memory in rodent models of brain disorders. These tests are effective for assessing pharmacological interventions, for example, the potential memory impairments in the offspring of pregnant mice exposed to cannabis smoke. NOR tests are often scored from videos by researchers, who are inherently variable and subject to fatigue. To standardize scoring, open-source software to reliably measure the location of rodents in a testing chamber have been developed and applied to score NOR. To evaluate one example of such software, EXPLORE, I applied it to two-object mouse and six-odour rat NOR tests and compared the output against human scoring. EXPLORE performed best on the two-object mouse tests when the testing environment was unchanged between trials, showing that the software is sensitive to object placement. The six-odour rat tests added complexity to the scoring, as more non-explorative behaviours (gnawing, rearing, and freezing) were observed. Currently, EXPLORE could not correctly discern between explorative and non-explorative behaviours on our six-odour rat tests. In conclusion, this software can be used by researchers without programming experience for NOR tests. Further testing on EXPLORE and validation against existing commercial software is needed.
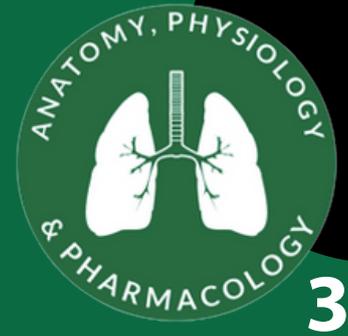
Patrick Sarmiento (Dr. Francisco Cayabyab)

Chronic Adenosine Receptor Stimulation Unmasks Non-Motor Symptoms in Novel Parkinson's Disease Model

Commonly identified through motor deficits, many non-motor symptoms also accompany Parkinson's disease, including psychological changes (e.g. depression, anxiety) and sensory deficits, such as olfactory dysfunction. These symptoms may arise during or even before motor deficits occur, so thorough investigation of these non-motor symptoms in animal models would prove clinically useful. I've chosen 28-day old male Sprague-Dawley rats to act as a novel Parkinson's disease model, induced by administering an agonist for adenosine A1 receptors in the brain. Adenosine, a major neuromodulator, regulates functions such as neuronal cell signaling, sleep, and memory. However, brain adenosine levels increase with age, leading to the accumulation of protein molecular markers of Parkinson's disease, such as phosphorylated α-synuclein.

Rats received chronic administration of adenosine receptor agonists and/or antagonists. Behavioural testing showed significant motor deficits in rats provided with adenosine A1 receptor agonists, indicating Parkinson's-like motor dysfunction. Behavioural testing also showed that these same rats have greater anxiety, a non-motor symptom of Parkinson's, with further behavioural testing needed to indicate other psychological changes. Within the rat olfactory bulb, Western blot analysis begins to show greater phosphorylated α-Synuclein levels in rats receiving the adenosine A1 receptor agonist, though more experimentation is needed to show statistical significance.
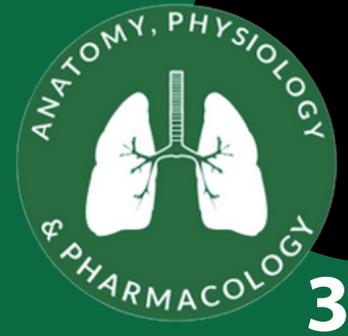
Chenkun (Steve) Zheng (Dr. Asmahan AbuArish)

Characterizing the cellular mechanism underlying stress regulation in human bronchial epithelial cells

Human bronchial epithelial (HBE) cells lining the airways are the first line of defense against inhaled irritants. Damage to these cells in lung diseases like chronic obstructive pulmonary disease compromises their protective function. We previously demonstrated that human bronchial epithelial cell lines form stress granules (SGs) when exposed to cigarette smoke extract (CSE). This response hinges on the activation of the integrated stress response (ISR) pathway through phosphorylation of the PERK kinase, which phosphorylates eIF2α, driving SG assembly. We hypothesize that primary HBE cells isolated from donors' airways behave similarly by forming SGs in response to CSE exposure, mediated by the activation of the ISR pathway. Our results show that both differentiated and undifferentiated HBE cells form SGs in response to CSE, and upon inhibiting the actions of phospho-eIF2α (p-eIF2α), SG assembly ceases. Furthermore, we report that threshold levels of p-eIF2α must be overcome for SG assembly to occur. We also show that inhibiting the action of p-PERK reduces p-eIF2α levels and abrogates SG formation. These findings suggest that the PERK/eIF2α axis of the ISR pathway governs SG assembly in both cell lines and primary HBE cells in response to CSE exposure.

Aluk Geu (Dr. Yuliang Wu)

DDX41 Helicase Co-localization with Nuclear Speckles and Its Relevance to Myeloid Malignancies

Myelodysplastic Syndrome (MDS) and Acute Myeloid Leukemia (AML) are hematopoietic-derived myeloid malignancies frequently associated with mutations in the RNA DEAD-box helicase DDX41. Previous work in the Wu lab has investigated the molecular pathogenesis of DDX41 mutations by examining cytoplasmic ribonucleoprotein (RNP) granule dynamics, specifically processing bodies (P-bodies, PBs) and stress granules (SGs). Given that DDX41 is primarily localized in the nucleus, we have expanded our investigation of RNP granules to include nuclear speckles (NS), which are phase-separated nuclear structures enriched in splicing components. We hypothesize that DDX41 co-localizes with nuclear speckles and plays a role in RNA splicing. Accordingly, DDX41 mutations may lead to decreased localization and aberrant splicing, promoting the rapid proliferation of immature cells and contributing to the development of MDS and AML. To investigate our hypothesis, we first utilized HT1080 wild-type (WT) cells to assess the role of DDX41 in nuclear speckle (NS) dynamics. Cells were subjected to nuclear stress via cisplatin treatment, followed by immunofluorescent staining with antibodies against SC35 and DDX41. Co-localization was visualized using confocal microscopy and quantified using Pearson's correlation coefficient. We observed that DDX41 positively correlates with SC35, and its localization to nuclear speckles decreases over the course of stress treatment.

Prashanth Pillay (Dr. Camille Hamula & Dr. Ninad Mehta)

Increasing Antimicrobial Resistance in Saskatchewan

Background: Antimicrobial resistant organisms (AROs) are of increasing concern to Saskatchewan clinicians with rising resistance rates shown in the RUH antibiogram data resulting in limited alternative treatment options.

Methods: From 2018 to 2024, routine cultures were collected across Saskatchewan and antimicrobial susceptibility testing was completed using VITEK. Surveillance culture data was obtained for vancomycin-resistant Enterococci (VRE), methicillin-resistant Staphylococcus aureus (MRSA), and carbapenemase producing organisms (CPO).

Results: Among routine culture data, increasing resistance patterns were most concerning for E. coli, K. pneumoniae, K. aerogenes, E. cloacae, and E. faecium. Both E. coli and K. pneumoniae displayed yearly increasing resistance to ceftriaxone at rates higher than 5% ($p < 0.01$). Similarly, K aerogenes and E. cloacae displayed increasing resistance to ertapenem at yearly rates of 2.9% and 6.0% respectively ($p < 0.01$). E. faecium exhibited increasing rates of resistance to vancomycin at 6.0% yearly ($p < 0.01$). Regarding surveillance data, MRSA was shown to be increasing at a yearly rate of 0.12% and VRE at a rate of 0.78% ($p < 0.05$).

Conclusion: Both routine and surveillance culture data analysis revealed multiple species of bacteria are showing increasing resistance year over year to various antibiotics in Saskatchewan.

Matthew Ritchie (Dr. Peter Pioli)

Effects of Toll-like Receptor 7 Deletion on Thymic B Cells and Antibody-Secreting Cells

Toll-like receptor 7 (TLR7) is an endosomal RNA-sensing receptor that promotes antiviral immunity through interferon induction as well as B cell activation and differentiation into antibody-secreting cells (ASCs). While protective in infection, dysregulated TLR7 signaling is implicated in autoimmune diseases such as systemic lupus erythematosus, in part by driving aberrant ASC expansion. Thymic ASCs, which are expanded in autoimmune conditions including myasthenia gravis, may represent a pathogenic subset influenced by TLR7 signaling. We used flow cytometry to assess thymic B cell populations (CD19+CD90.2-CD138-/LO), TLR7 expression, activation status (MHCII), proliferation (Ki67), and ASC numbers (CD138HIIgD-CD267(TACI)+CD44+) in 10–13-weeks-old wildtype and TLR7 knockout (KO) mice. Results were compared between females and males to evaluate potential sex-related differences. As expected, thymic B cells from TLR7 KO mice lacked TLR7 expression. Deletion of TLR7 did not significantly affect thymic B cell numbers or expression of MHCII and Ki67, though male TLR7 KO mice showed trends toward increased B cell numbers and MHCII expression. In contrast, TLR7 KO animals had significantly reduced thymic ASC numbers in both sexes (p<0.05). These data indicate that TLR7 is a critical driver of ASC differentiation within the thymic microenvironment.

Samantha Allan (Dr. Linda Chelico)

APOBEC3B Regulates cMyc Through Protein-Protein Interactions

APOBEC3 enzymes are known for their roles as deoxycytidine deaminases but have been shown to have deaminase independent functions mediated through protein-protein interactions. APOBEC3B (A3B) engages in these protein-protein interactions to dysregulate cMyc, an oncogene involved in tumor growth. Mass spectrometry showed that A3B interacts with two proteins, prefoldin 5 (PFD5) and HUWE1, both known cMyc regulators. Using a western blot, we were able to analyze the outcome on cMyc when either PFD5 or HUWE1 interacted with A3B. We repeated previous work that demonstrated that A3B inhibits the ability of prefoldin 5 (PFD5) to induce degradation of cMyc. Through further studies we were able to determine that HUWE1 stabilizes cMyc and the A3B-HUWE1 interaction exhibits further stabilization of cMyc. Altogether, the results demonstrate that further work is to be done in cancer cell lines to determine the consistency and relevance to cancer cell biology.

Andrew Delainey (Dr. Jenny Wachter)

Investigation of the Understudied Bacteriophages of Borrelia Burgdorferi

Borrelia burgdorferi, the causative agent of Lyme disease, contains up to ten prophage plasmids known as cp32. The cp32 phages act as transducing agents, transferring DNA between Borrelia. We engineered a B. burgdorferi strain lacking all cp32 plasmids (Δcp32) and set forth to investigate whether cp32 plasmids would be regained during co-growth with cp32-containing strains. Experiments paired either ibbd18Δcp32 recipients with wild-type (wt) donors or Δcp32 recipients with ibbd18 donors. The ibbd18 derivative carries a unique antibiotic resistance cassette and can undergo phage induction under specific conditions. Wt cells also induce cp32 phages following ethanol treatment.

Co-growth experiments showed no growth defects. 150 colonies per co-growth condition were screened by end-point PCR. Conditions tested included wt with ibbd18Δcp32, ethanol-induced wt with ibbd18Δcp32, and Δcp32 with induced ibbd18. No evidence of cp32 transduction was observed. This contrasts with previous findings reporting horizontal gene transfer under phage-inducing conditions. Strain specific or experimental variables may have limited transduction, and further experiments are planned.

Notably, phage induction produced detectable cp32 prophages in supernatants, along with lp28-2, which may encode an alternative phage. Overall, phage mediated HGT is thought to be critical to the pathogenicity and lifecycle of Borrelia, warranting the need for further research.

Presly Goodwin (Dr. Jenny-Lee Thomassin)

Defining Citrobacter rodentium type II secretion system activating conditions

Citrobacter rodentium is a natural murine infection that is used as a surrogate animal model for enteropathogenic and enterohemorrhagic Escherichia coli (EPEC and EHEC) due to their shared core virulence factors. One shared virulence factor C. rodentium has with EPEC and EHEC is the type II secretion system (T2SS), which is used by bacteria to secrete proteins, including toxins, to cause infections. The T2SS in C. rodentium has been shown to be required for host infection, but in vitro activation conditions and secreted proteins remain unknown. This project aims to use chromosomal translational fusions of lacZ fused to components of the T2SS to monitor the activation of key T2SS genes gspA, gspC, gspD, and gspG to monitor T2SS activation. This study shows that the T2SS is growth phase responsive with the highest activity in late exponential and early stationary growth phases. In addition, my results also suggest that the T2SS responds to host signals encountered in the murine intestinal tract during infection. Further work will investigate if high T2SS levels correlate with active protein secretion.

Atharv Govardhan (Dr. George Katselis)

Investigating the Role of Diabetic Pregnancies in Kidney Disease Using Urine Proteomics

This study investigates the role of maternal gestational diabetes mellitus (GDM) in influencing early kidney disease risk in offspring through urinary proteomics analysis. Using mass spectrometry-based proteomics, we analyzed and compared urinary protein profiles in infants born to mothers with GDM against those without diabetes. With the aid of bioinformatics analyses, we identified several differentially expressed proteins, including mitochondrial Adrenodoxin (linked to oxidative stress), Polyubiquitin-C (involved in protein degradation), Megakaryocyte-Potentiating Factor, Mimecan (both associated with renal fibrosis), and inflammatory mediators such as Interferon regulatory factor 7 and Processed Fractalkine. These proteins suggest involvement in key biopathological processes—such as mitochondrial dysfunction, cellular imbalance, tissue remodeling, and inflammation—that may predispose individuals to diabetic kidney disease (DKD). Technical approaches included in-solution digestion, LC-MS/MS analysis, and database searching to identify and characterize urinary proteins. The findings highlight how maternal diabetes can shape long-term renal outcomes in children and underscore the potential of urine proteomics as a non-invasive tool for early DKD detection. Further validation is required to confirm the mechanistic roles of these proteins and their utility as clinical biomarkers.

Kirsten Lowe (Dr. Jo-Anne Dillon)

A Plasmid Toolbox for Exploring Neisseria gonorrhoeae FtsI N-Terminus Mutations and Bacterial Growth

FtsI, a penicillin-binding protein, is a transpeptidase found in thousands of bacterial species and is essential for bacterial cell wall synthesis. It is the primary target of β-lactam antibiotics. Mutations at four critical N-terminus residues (R75, R167, G180, E193) conserved not only in Neisseria species, but also across more than 2,000 Proteobacteria, were identified in vitro as having the ability in Neisseria gonorrhoeae (Ng) to enhance the protein's affinity for penicillin. In my research, I aimed to create a toolbox of various Ng and Escherichia coli (Ec) plasmids containing FtsING, with and without mutations at these four critical residues, using restriction cloning and site-directed mutagenesis. We have created a library of plasmids that can be used for rapid investigation of N-terminus mutations in FtsING and FtsIEc. Many of the plasmids in this library can also be utilized as a template for site directed mutagenesis to introduce the R75G, R167A, G180R and E193A FtsI mutations. Our data indicates that FtsING is unable to support cell growth in EC812 with depleted chromosomal FtsI, demonstrating that despite being a conserved replication protein, FtsING is species specific. Through increases and decreases in Ec cell length, our data also indicates that FtsING being overexpressed in the cell could be interfering with the division process.

Eric Luo (Dr. Jenny Wachter)

Exploring the antigenic variation mechanisms in Borrelia burgdorferi

Borrelia burgdorferi (Bb), the causative agent of Lyme disease, is the most common tick-borne pathogen in North America. Bb undergoes antigenic variation, allowing the spirochete to evade host immune responses and establish persistent infection. This process is mediated at the vls locus on plasmid lp28-1, where the expression site vlsE can recombine with 15 different silent cassettes. Antigenic variation does not normally occur during in vitro growth. However, an engineered Bb strain (S9 fla-bbd18) that constitutively overexpresses the regulatory protein BBD18, has been shown to undergo vls recombination in vitro in mildly acidic conditions (pH 6.8) in previous work. Using qRT-PCR, we confirmed the overexpression of BBD18. Using PacBio sequencing, we aim to characterize and confirm the presence of antigenic variation in this strain. Additionally, we designed plasmids for CRISPR interference to downregulate genes thought to be involved in antigenic variation. Our findings suggest that antigenic variation in vitro is absent at pH 7.6 in this strain, but future work will assess growth under mildly acidic conditions to confirm and characterize the presence of antigenic variation under these conditions. Additionally, future work will assess the roles of ruvA, ruvB, and mutL on antigenic variation.

Tanisha Mehra (Dr. Jeff Dong)

Spatial Transcriptomic Analysis Of Oxidized Phosphatidylcholine Mediated Chronic Neurodegeneration And Multiple Sclerosis

Multiple sclerosis (MS) is a chronic neuroinflammatory and neurodegenerative disease, with Saskatchewan having one of the highest prevalence rates in Canada. Aging is often associated with higher risk of developing progressive MS. Progressive-MS is characterized by continually worsening symptoms with no episode of relapses. The lesion in P-MS is characterized by an inactive lesion core surrounding by a radially active rim. There is no effective treatment for progressive-MS because the mechanism of lesion development remains relatively unclear. Previously, we demonstrated the accumulation of oxidized phosphatidylcholines (OxPCs), neurotoxic byproducts in oxidative stress, in the spinal cord white matter (SCWM) induces tissue pathology like human PMS lesions, thus providing a platform to investigate progressive disease mechanisms. Although spatial transcriptomic analysis has begun on human MS tissues, we specifically do not know how transcriptomic changes occur across an OxPC lesion. To address this gap of knowledge I analyzed day 42 spinal cord white matter lesion of young (6 week) and old mice (52 week) on Seurat platform. I found pathways associated with ensheathment of neurons to be upregulated in young as compared to the old lesion. My future plan is to look at changes in microglia/macrophage subset across the lesion.

Paul Sebastian Moscoso Serrano (Dr. Yulaing Wu)

Identifying synthetic lethality targets of DDX41 mutation

Patients with myelodysplastic syndrome and acute myeloid leukemia have been associated with mutations in the DDX41 (DEAD-box helicase 41) gene, specifically the R525H mutation. One strategy was to find a cure related to the DDX41 mutant protein; however, this presented a challenge, as DDX41 shares a similar structure with other DEAD box helicases present in the human body. Here, synthetic lethality (SL) is implemented as a potential solution, as it does not directly target the gene of interest. Bioinformatic analyses have found various SL targets of DDX41, including the WRN gene. To evaluate the inactivation of WRN in DDX41-deficient cells, a shRNA virus was prepared to infect HeLa, U2OS, and KMST1 cells, and knock-down (KD) the expression of DDX41. These cells were then treated with a WRN inhibitory drug, HRO761, at different concentrations. Cell growth and proliferation of these cells were controlled over six days. It was found that HRO761 inhibited the growth of DDX41-KD cells compared to DDX41 wild-type. It was also observed that depletion of DDX41 affected in the levels of markers from the mismatch repair system, such as MSH-2 and MLH-1. Future assessment of this strategy includes determining the molecular mechanisms behind the SL interaction presented.

Eve Simpson (Dr. Anil Kumar)

Analysis of Eastern equine encephalitis virus NSP1 protein's interaction with cellular vATPase complex

Eastern equine encephalitis virus (EEEV) is a mosquito-transmitted human pathogen endemic to eastern Canada and the U.S. The virus causes fatal encephalitis in humans. Currently, there are no approved antivirals or vaccines for humans. The Kumar lab had previously mapped the host protein interactome of all EEEV-encoded proteins using affinity purification and mass spectrometry. Components of the host Vacuolar ATPases (vATPases) machinery were identified as an interaction partner of NSP1 protein of EEEV. NSP1 is essential for viral protein translation and viral RNA capping. vATPases play roles in vesicle acidification, membrane trafficking, and protein processing. We hypothesize that NSP1 interacts with vATPases and modulate its function to enhance viral replication during infection. To validate this interaction, we transfected HEK293T cells with tagged versions of both proteins and performed co-immunoprecipitation and western blot assays. To visualize the localization of both proteins in cells, we performed immunofluorescence assay. Our experiments showed a moderate enrichment of ATP6V1B2 in NSP1 immunoprecipitation samples compared to a control viral protein. Co-localization could not be visualized as no co-expression of NSP1 and ATP6V1B2 was detected in co-transfected cells. Further experiments are needed to confirm the interaction of NSP1 with vATPase and identify its role in virus replication.

Lauryn Urzada (Dr. Angela Rasmussen)

Effect of sex hormones on Ebola virus proteins

Ebola virus (EBOV) causes severe hemorrhagic fever in humans, and Ebola virus disease (EVD) has a case fatality rate ranging from 30-90%. Sex-biased outcomes have been observed for EVD, in which female patients are more likely to survive than males. Sex bias in immunity is complex and can be influenced by sex-linked gene expression, sex hormones, and anatomical and physiological variations. Additionally, EBOV proteins VP24, 35, and 40 are known to antagonize the immune response. Specifically, VP24 inhibits the activation of the Interferon Stimulated Response Elements (ISRE), preventing transcription of interferon stimulated genes. Our project first aims to develop an assay to investigate whether estrogens and androgens modulate the function of VP24. To accomplish this, we developed a hormone-responsive system in HEK293T cells by transfecting them with estrogen receptor alpha. We confirmed that these transfected cells responded to estradiol (E2) using RT-qPCR. Before adding VP24 to the system, we assessed the impact of E2 on interferon-beta signalling using a dual luciferase assay, which decreased ISRE stimulation. Next, we will investigate the effect of E2 signalling on VP24 ISRE antagonism using this established protocol and expand to investigate the same assay with androgens.

Wayne Wang (Dr. Wei Xiao)

Investigating Fzf1-Mediated Chemical Detoxification Network

Fzf1 is a small zinc-finger transcription factor in Saccharomyces cerevisiae that regulates a broad range of chemical detoxification genes. It contains five zinc-finger (ZF) motifs: ZF1–3 form the DNA-binding domain, while ZF4 represses the activation domain ZF5, preventing transcription under basal conditions. This repression is relieved under chemical stress. Previous studies have shown that truncation of the C-terminal region (CT) strongly upregulates detoxification genes. AlphaFold3 predictions suggest that ZF4 and the CT—comprising two C-terminal helices (CTH), CTH1 and CTH2—form a pocket that modulates ZF5 activity. To assess the regulatory contributions of these domains, we generated deletion mutants and analyzed their effects on sulfite resistance and detoxification gene expression. While complete CT deletion strongly upregulated DDI2/3, SSU1, YHB1, and YNR064c, truncation of either CTH1 or CTH2 caused only mild de-repression, indicating that CTH1 and CTH2 act redundantly to maintain most ZF5 repression. Moreover, combining the ΔCT mutation with a ZF4 mutation abolished both detox gene induction and sulfite resistance, suggesting that the double mutant either disrupts the structural environment surrounding ZF5—keeping the activation domain repressed—or compromises overall Fzf1 protein stability.

Christine Joyce Francisco (Dr. Jessica Sheldon)

Characterization of iron acquisition pathways in Morganella morganii, an emerging opportunistic pathogen

Morganella morganii is an emerging multidrug-resistant pathogen, however vanishingly little is known about the basic biology of this bacterium. Iron is an essential micronutrient for almost all organisms and can markedly impact the fitness of bacteria when homeostatic concentrations are perturbed. As such, bacteria have finely tuned transcriptional responses to iron availability that mediate its uptake when limited, and its efflux and/or sequestration when in excess. Although M. morganii possesses genes for the uptake of small iron-binding molecules, known as siderophores, sequencing performed by our lab on modern clinical isolates reveals no discernable loci for siderophore synthesis. This project thus aims to identify the key iron uptake pathways and preferred source(s) of metal for M. morganii. Growth curves demonstrated utilization of diverse iron sources while RNA sequencing of M. morganii exposed to iron-deplete and -replete conditions revealed genes highly upregulated under nutrient limitation. These genes, implicated in the uptake of ferric citrate, siderophores, and ferrous iron, may contribute to the iron acquisition machinery of the pathogen and represent putative drug targets. For future directions, we aim to study these genes in detail by generating mutants in key candidates and assessing their individual effects on the iron-dependent growth of M. morganii.

Community & Indigenous Health

Ibrahim Al-Mouaiad Al-Azem (Dr. Michelle Collins)

Genetic Cardiovascular Disease in Saskatchewan: A Retrospective Clinical and Demographic Chart Review

Genetic testing is increasingly used in cardiovascular care, yet data on testing patterns and diagnostic yields across cardiac phenotypes remain limited. Evaluating genetic findings in Saskatchewan is vital for optimizing testing strategies, improving variant interpretation, and guiding patient counselling.

We performed a retrospective chart review of patients referred to the Saskatchewan Health Authority (SHA) Medical Genetics service between 2014-2024. Where we identified patients that were referred to due to a cardiovascular diagnosis. At which point retrieved relevant information such as the cardiac diagnosis and genetic testing results. From there we were able to analyze the prevalence and distribution of cardiovascular conditions across the cohort.

In total, we reviewed and collected data from 880 patients, including 560 adults and 320 pediatric cases (<17 years) with near-equal sex distribution (458 males, 422 females). Among these, 326 patients carried pathogenic/likely pathogenic variants, while 155 had one or more variant of unknown significance (VUS), and 334 received uninformative results. Cardiomyopathy yielded the most pathogenic findings with clear clinical utility, while congenital heart disease and arrhythmias showed frequent VUS and inconclusive results.

Genetic testing revealed a mix of pathogenic findings, VUS and inconclusive results, underscoring the complexity of interpreting cardiovascular genetics.

Elliot Grande-Sherbert (Dr. Andrew Kirk)

Polypharmacy and 1-year prognosis in persons referred to a rural and remote memory clinic

Background: Polypharmacy, the use of ≥5 regular medications, is common in rural older adults and those with dementia.

Objective: To evaluate the relationship between number of medications and one-year change in cognition, function, and behaviour among rural-dwelling older adults referred to a memory clinic.

Methods: We conducted a retrospective cohort study of patients assessed at the Rural and Remote Memory Clinic (RRMC) in Saskatoon, Saskatchewan, Canada from 2004-2020. Baseline medication burden was examined as a predictor for 1-year change in the Mini-Mental State Exam (MMSE), Functional Activities Questionnaire (FAQ), Neuropsychiatric Inventories (NPI-S, NPI-D), and Clinical Dementia Rating Scale, Sum of Boxes (CDR-SB).

Results: A total of 321 patients were included (mean medication count 5.2). In those with dementia, higher prescription count was associated with a 0.43 smaller rise in FAQ score (B = -0.43, 95% CI: -0.83 to -0.03, p=0.034). After adjusting for baseline FAQ, this association was attenuated and no longer significant (B =-0.36, 95%CI: -0.73 to 0.01, p=0.055, R_2=0.168, n=125). No other significant associations were observed.

Conclusion: Number of medications did not predict cognitive, behavioural, or functional outcomes. Findings support routine medication reviews and rational deprescribing in rural older adults.

Sukhman Kaur (Dr. Michelle Collins)

A retrospective review of atrial fibrillation cases to explore genetic associations

Atrial fibrillation (AF) is an arrythmia that can increase risk of certain health outcomes and may have a genetic cause amongst other causes. The project aimed to understand genetic factors that influence AF development in individuals. A retrospective chart review was conducted on 452 charts, that were de-identified, assigned a unique study id and screened through an inclusion and exclusion criteria. 54 eligible cases met the inclusion criteria from which: 45 males and 9 females with mean age 52.58 (ranging from 28-65) and mean BMI of 27.69 (ranging from 21.09-31), including 14 cases with 1st degree relative with AF (from which 4 patients had 2 or more 1st degree relatives with AF). From the cases who did not meet the inclusion criteria, 7 patients demonstrated strong family history of AF with multiple 1st degree relatives with AF. Types of AF documented in the cases were also identified. The future direction is to contact, consent and recruit individuals to collect blood serum samples to identify genetic markers. The vision is to be able to identify people who carry certain risk alleles that may be linked to AF which can help identify AF early and tailor treatment better suited for those individuals.
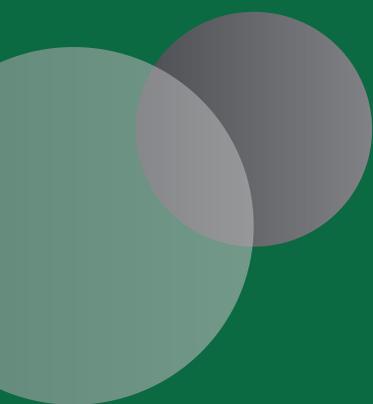
Vaidehee Lanke (Dr. Nazeem Muhajarine)

Evaluating the associations between maternal mental health and opioid use disorder in Saskatchewan

The relationship between maternal mental health and opioid use is a complex one and adversely impacts maternal and infant health. Opioid use disorder (OUD) during pregnancy is associated with poor maternal and infant health outcomes including maternal death, preterm birth, stillbirth, neonatal abstinence syndrome and poor fetal growth. Substance use disorders (SUD), including OUD, commonly co-occur with mental health conditions. Individuals with mental health conditions, including anxiety, mood disorders, major depressive disorder, post-traumatic stress disorder and schizophrenia, are at a higher risk of developing a SUD compared to those without a mental health condition and vice versa. Untreated SUD and maternal mental conditions are linked to higher risk pregnancies and poor health outcomes for both the parent and infant. This project aims to understand and quantify the relationship between maternal mental health and OUD in Saskatchewan between 2017 – 2025, including the point prevalence, incidence and evolution of co-occurrence of OUD and mental health conditions in the perinatal population. Our project hopes to contribute to the development of interventions and clinical guidelines that support maternal health, including programs addressing both OUD maternal mental health.

Timi Oni (Dr. Jacob Alhassan)

"They can't get to where they need to be": Community Definitions of Transportation Poverty and its Health Impacts in Saskatchewan

Transportation poverty refers to the challenges individuals face when poor access, high costs, and unsafe conditions restrict their ability to participate in daily life. To better understand the concept within the Saskatchewan context, this study explored how community stakeholders define transportation poverty and its impacts on health in the province. We interviewed 12 nonprofit leaders and government workers across Saskatchewan, and inductive analysis identified transportation poverty as a set of interconnected barriers that shape both opportunity and wellbeing. Stakeholders emphasized how lack of affordability, limited transit services, and inadequate alternatives such as walking or cycling restrict participation in work, education, and community. Dependence on unreliable systems reduces independence and autonomy, while safety concerns and discrimination further marginalize Indigenous communities, women, seniors, and people with disabilities. Together, these barriers shape health outcomes by limiting access to routine and specialized services, discouraging preventative care, and compounding mental health challenges through isolation. Community stakeholders ultimately framed transportation poverty as a structural barrier that makes mobility unaffordable, unreliable, and unsafe. Addressing it requires long-term strategies that include transportation within broader health, equity, and infrastructure planning.

Lexi Pflanzner (Dr. Jacob Alhassan)

Mobility Matters: Impact of a free bus service on quality of life in older adults: A mixed-methods study from Northern Saskatchewan

Transportation is a critical yet often overlooked social determinant of health, shaping access to care, services, and social connection. In response to transportation gaps in rural Saskatchewan, community-led initiatives like the Kikinahk bus service in La Ronge have emerged to improve access to healthcare services and support social participation. We collected quantitative data from 179 bus riders on demographics, travel patterns, reasons for use, alternative travel options, and types of medical appointments. In addition, we conducted semi-structured interviews with 19 bus riders to explore how access to the Kikinahk bus influenced older adults' quality of life and social participation. Participants used the bus for various purposes, including visiting family and friends and attending medical appointments. Thus far, qualitative data analysis has shown that the bus service supported older adults by promoting autonomy, freedom, and independence; improving access to services; supporting socialization; and reducing stress while improving mental health. These findings reinforce the importance of viewing transportation as essential infrastructure for healthy aging. Sustainable investment and policy change to support equitable rural transportation models are critical to ensuring access to healthcare services and promoting social inclusion for Saskatchewan's rural and aging population.

Zili Zhou (Dr. Cory Neudorf)

Development of a Macro-Evaluation of Simultaneous HPV Program Improvement Efforts Across Canada

Background: Human papillomavirus (HPV) vaccination is a cornerstone of cancer prevention, yet uptake across Canada remains uneven. Frameworks such as the Consolidated Framework for Implementation Research (CFIR) and RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) provide complementary insights: CFIR explains site-specific enablers and barriers, while RE-AIM emphasizes population-level reach and sustainability. Integrating these perspectives with equity considerations is critical for national program evaluation.

Methods: A literature review was conducted to identify frameworks used in multi-site vaccine program evaluations, focusing on CFIR, RE-AIM, and equity-oriented adaptations. Semi-structured partner organization interviews were coded in NVivo, and themes were analyzed by frequency and alignment with framework constructs.

Results: The literature highlighted adaptability, engagement, and contextual readiness as determinants of uptake, with RE-AIM favored for macro-evaluations of impact. Coding results emphasized expert involvement (15), partnerships (14–13), and information sharing (10) as top enablers. Additional themes included adaptability, team capacity, cultural tailoring, and funding adequacy. Barriers included misinformation, mistrust in healthcare systems, and vaccine safety concerns.

Discussion: Literature and partner perspectives converge on the importance of partnerships, adaptability, and trust-building for effective HPV program delivery. CFIR helps explain contextual variation, while RE-AIM supports evaluation of reach and sustainability. Equity adaptations are needed to capture cultural alignment and trust.

Conclusion: A blended RE-AIM + CFIR approach, enriched with equity considerations, provides a comprehensive framework for macro-evaluating HPV vaccination programs. This ensures evaluations capture both outcomes and context—explaining not only what works, but how, why, and for whom.

Hibah Zia (Dr. Jocelyne Martel)

Mothers at the Margins: The Impact of Homelessness in Pregnancy in Saskatoon, Saskatchewan

Background: Homelessness is a major social determinant of health and is associated with increased risk of adverse maternal/neonatal outcomes. Localized data on the pregnant population remains limited. The purpose of this study is to evaluate admissions and health outcomes for unhoused pregnant patients at Jim Pattison Children's Hospital (JPCH).

Methods: A retrospective chart review was conducted for unhoused pregnant patients admitted to the Prenatal Unit at JPCH between January 2021 and December 2024. We collected rates of prenatal and intrapartum complications, neonatal outcomes, and hospital length of stay.

Results: Over time, we recorded an increase in the number of annual admissions (36 vs. 71; $p < 0.01$) and hospital days (309 vs. 934; $p < 0.01$). Infections such as HIV, syphilis and urinary tract all showed significant increases. Pregnancy complications such as GDM and anemia were both significantly increased. Contributing social stressors like mental illness and IPV increased. There were increasing risks of postpartum hemorrhage and transfusion. There were more preterm births over the years, but rates of low birth weight remained stable.

Discussion: Our findings highlight increased admissions as well as maternal/neonatal morbidity among unhoused prenatal patients over this period. Housing focused interventions could improve outcomes.

Hamzeh Al-Barqawi (Drs. Hassan Vatanparast & Phil Chilibeck)

The effects of yogurt vs milk on bone health, body composition and gut microbiota

This interdisciplinary placement provided me with the opportunity to contribute to two research projects: the Milk & Yogurt Study, a randomized controlled trial evaluating the impact of milk and yogurt supplementation on bone health, body composition, and gut health in Canadian adults, and the Nutrition & Growth Study, which investigates milk and dairy consumption and growth outcomes in Canadian children. Study participants in the Milk & Yogurt Study were nearly equally split by gender, with 53% born in Canada and 47% born internationally. Most participants held a bachelor's degree (61.7%) and were students (60.3%). My role involved participant scheduling, dietary and physical activity data collection, saliva and stool sample handling, DXA scanning support, questionnaire administration, and data entry using REDCap. This experience enhanced my skills in data collection, management, and interpretation while strengthening teamwork, communication, and participant engagement competencies.

Anas Arwini (Dr. Andrew Kirk)

Predictors of Long-term Care Admission in a Rural and Remote Memory Clinic

Introduction: Caregivers face unique challenges when transitioning from at-home care to long-term care (LTC). We aimed to elucidate predictors of LTC admission within two years of initial presentation to a Rural and Remote Memory Clinic (RRMC) in Saskatchewan.

Methods: Analysis included 635 patients seen between March 2004 and June 2019 (admitted to LTC within two years = 222, not admitted = 413). Patients were assessed neuropsychologically and administered questionnaires.

Results: Univariate logistic regressions showed that advanced age (OR = 1.05, CI = 1.04-1.07), female sex (OR = 1.79, CI = 1.28-2.52), higher Functional Activities Questionnaire (OR = 1.09, CI = 1.06-1.11), lower MMSE (OR = 0.861, CI = 0.827-0.897), and higher Clinical Dementia Rating score (OR = 1.13, CI = 1.06-1.21) remained significant ($p < .001$).

Discussion: Being older, female, more dependent in activities of daily living, and having more severe dementia predicted LTC admission, potentially helping in planning care.

Emergency Medicine

Mirza (Sarim) Asim (Drs. Shain Thakra & Hannah Buhariwalla)

Physician Perspectives of Opioid Agonist Therapy Prescribing and Suboxone Macrodosing in the Emergency Department: A mixed methods study

Background: Emergency-department initiation of buprenorphine/naloxone (bup/nal) reduces opioid-related harm, yet uptake of bup/nal prescribing and use of a newly developed macrodosing practitioner pre-order set (PPO) remain uncertain.

Methods: A cross-sectional, mixed-methods survey was administered to physicians and residents from emergency medicine, internal medicine, and psychiatry across Saskatchewan Health Authority emergency departments. The questionnaire collected demographics, knowledge and attitudes toward opioid agonist therapy (OAT) and induction strategies (standard, micro- and macrodosing), as well as open-ended responses on barriers and facilitators. Quantitative data were analyzed descriptively, and qualitative responses underwent reflexive thematic analysis using Braun and Clarke's six-step approach.

Results: Forty-four physicians responded; 35/44 (79.5%) were emergency physicians at urban tertiary care settings. Of the 33 who had initiated bup/nal: 15 used macrodosing, 13 standard induction, and 5 micro-dosing. Barriers to initiating OAT were inability to arrange follow-up and lack of comfort. Hesitancy toward macrodosing stemmed from limited follow-up resources, training opportunities, and lack of formal ED protocols. Qualitative themes reflected knowledge gaps, systemic barriers, and concerns about precipitated withdrawal and monitoring in crowded emergency departments.

Conclusions: Physicians generally support bup/nal initiation and acknowledged macrodosing as a safe and effective approach, yet uptake remains constrained by training deficits, absent protocols, and inadequate follow-up infrastructure.

Stefanie Kiriazopoulos (Drs. Tracy Wilson & James Stempien)

Comparing Emergency Department Pain Management Practices for Pediatric Musculoskeletal Injuries

Musculoskeletal (MSK) injuries requiring a visit to the Emergency Department (ED) are common in children and often associated with moderate to severe pain. Despite this, identification and management of pediatric pain remains a considerable challenge. This study examines analgesic practices among children with MSK injuries presenting to three Saskatchewan EDs.

All patients aged 0-17 with acute MSK injuries between 2022 and 2024 at the Regina General Hospital (RGH), Pasqua Hospital (PH), and Jim Pattison Children's Hospital (JPCH) were identified. Chart reviews were conducted and demographics, triage, diagnosis, pain assessment, and analgesia were collected. Primary outcomes included ED analgesic use and time to first dose. Site comparisons used chi-square and Kruskal-Wallis tests.

Among 600 patients (200 per site), 49.7% received ED analgesia, varying by site (JPCH 65%, PH 48%, RGH 36%; $p<0.001$). Median time to first analgesic was shortest at JPCH (3 minutes) versus PH (55 minutes) and RGH (26 minutes) ($p<0.001$). JPCH triaged more patients as lower acuity and had the shortest median length of stay ($p<0.001$). Pre-treatment pain assessment was documented least frequently at JPCH ($p<0.001$).

Significant differences in analgesia use and timeliness exist across Saskatchewan EDs, with the pediatric ED providing faster, more frequent pain treatment.

Jenna Schlosser (Drs. Tracy Wilson & James Stempien)

Palliative Care Screening and Consults in the Emergency Department

Background: As the demand for palliative care (PC) increases, emergency departments (EDs) are important in initiating early PC screening and consults. While a Palliative Care and Rapid Emergency Screening (P-CaRES) tool exists, PC consults remain infrequent in EDs. We aimed to determine the current PC needs in a Saskatoon ED by identifying patients meeting eligibility requirements for PC consults and comparing them with current consult rates.

Methods: A retrospective chart review of patients with life-limiting illnesses presenting to St. Paul's ED in October and December 2024. Patients were screened using P-CaRES criteria to determine PC consult eligibility. Analysis included descriptive statistics and comparisons using Chi-square and Fisher's exact tests.

Results: 189 charts were included in the PCaRES screening; 68.8% met criteria for a PC consult, and 3.7% received one (p<0.0001). Advanced cancer patients represented 9.02% of those eligible for consult but accounted for 86% of the consults (p<0.0001). Consulted patients had higher in-hospital mortality (57.1%) than those eligible but not consulted (9.8%) (p=0.0002).

Discussion: PC consults are frequently missed in the ED, especially for non-malignant conditions, and are often initiated later in a patient's illness course. These findings highlight an opportunity to improve patient care through earlier screening and timely referrals to PC services.

Ally Clarke(Dr. Tahereh Haji)

Impact of Emergency Department Preventative Strategies on Acute Asthma Revisits

Despite the available evidence-based guidelines for asthma management, asthma prevalence is increasing, and exacerbations continue to be a major cause of emergency department (ED) visits (1). Therefore, we aimed to determine which emergency department preventative strategies (EDPS) are being implemented in Regina EDs and if these strategies effectively prevent asthma-related ED revisits. We hypothesized that the current EDPS used in Regina are not sufficient for preventing asthma revisits. We conducted a retrospective chart review of all patients aged 1-17 years inclusive that have presented to Regina area EDs for an acute asthma exacerbation from September 1, 2023 – August 31st, 2024. EDPS included the provision of a prescription for the inhaled corticosteroid, an asthma action plan (AAP), and/or referral to a pediatrician or pediatric respirologist. 315 patients were identified, and 237 patients met the inclusion criteria. Inhaled corticosteroid prescription was the preferred EDPS for preventing asthma exacerbation-related revisits to the ED. However, 24% of patients returned to the ED for an acute asthma exacerbation during the study period, and none of the EDPS demonstrated an impact on decreasing revisits. Further studies are needed to better characterize the EDPS and the context of their use, and outpatient asthma education programs for post-ED visits should be considered.

Taegan Isaac (Dr. Amal Khan)

Assessing Autonomic Response in Diabetic Patients through idMed Neurolight Pupillometer

Introduction: Diabetic Autonomic Neuropathy affects between 31-73% of people with T2DM. Cardiac Autonomic Neuropathy increases the likelihood of a major cardiovascular event by 2-3x and 5-year mortality rate by 5x. Current screening methods are time or resource intensive, especially in an acute care setting. Pupillometry has previously been shown to be a simple, inexpensive, and non-invasive tool to screen for autonomic neuropathy.

Objectives: Validate the idMed Neurolight as a reliable and sensitive tool for early detection of autonomic dysfunction through assessment of pupil light response.

Methods: The idMed Neurolight was used to collect light reflex information on both known diabetic patients and healthy controls presenting to the Battlefords Union Hospital ER. Symptoms of Autonomic Neuropathy were assessed using the Survey of Autonomic Symptoms, dividing diabetic patients into low, medium, and high symptom burden. Baseline Pupil Diameter and Amplitude of Pupillary Contraction were compared to SAS score, and assess visually using graphs.

Results: There were observable differences in Amplitude of Constriction and Baseline Pupil diameter between Control and Moderate symptom groups. Similar levels were observed between all Diabetics and Control.

Conclusion: The differences between Moderate and Control groups are promising for Neurolight's role as a screening tool for Diabetic Autonomic Neuropathy.

TDanielle Major (Dr. Angela Baerwald)

The use of a quantitative point of care urine hormone measurement device for detecting human ovulation

Introduction: The Mira Monitor is a novel point of care device for quantifying hormone concentrations. The objective of this research was to test the hypothesis that urine hormone concentrations using the Mira Monitor would positively correlate with hormone concentrations obtained using dried bloods spots (DBS) across the menstrual cycle.

Methods: A prospective observational study was conducted in 30 women of reproductive age during one complete interovulatory interval (IOI). The Mira Monitor was used to quantify urine concentrations of Follicle Stimulating Hormone, Luteinizing Hormone, Estrone-3 Glucuronide, and Pregnanediol Glucuronide every day across the IOI. Urine concentrations were correlated with DBS equivalents using Pearson's correlation (SAS 9.4, Cary, NC, USA).

Results: Urine concentrations of FSH positively correlated with DBS concentrations in both the luteal (r=0.61) and follicular (0.3) phases of the IOI (p<0.0001). Similarly, positive correlations between urine and DBS concentrations of LH were reported in the luteal (r=0.54) and follicular (0.51) phases (p<0.0001).

Conclusions: Further research to correlate urine vs DBS concentrations of estrogen and progesterone are ongoing. Preliminary findings are promising for validating the Mira Monitor as a practical, reliable, and non-invasive research tool for quantifying hormone concentrations across the menstrual cycle.

Erika Whyte (Dr. Joshua Lawson)

Risk Factors for Asthma–Neurodevelopmental Disorder Multimorbidity in Canadian Children: A National Longitudinal Study

Background: Asthma and neurodevelopmental disorders (NMD) are associated. Understanding the risk factors that contribute to developing this multimorbidity are important to both clinical practice and public health. We used longitudinal data from a nationally representative sample to investigate risk factors for the development of asthma, NMD, and their multimorbidity.

Methods: Data was from the Canadian Health Survey of Children and Youth. Children were followed from 2019 to 2023 to track change in condition status (no asthma or NMD; asthma only; NMD only; both asthma and NMD). Survey responses about risk factors were assessed and associated with these changes.

Results: A greater proportion of children developed NMD than asthma. Having other chronic conditions was associated with increased odds of developing multimorbidity, while non-white ethnic background was protective. Allergies, regular alcohol use, and eating breakfast regularly were associated with increased risk of developing asthma while being born outside of Canada and having other chronic conditions were protective. Female sex, food insecurity, and allergies increased the risk of developing NMD while meeting sleep guidelines, eating breakfast regularly, and eating meals with family were protective.

Conclusions: We confirmed several risk factors of asthma, NMD, and multimorbidity as well as identified unexpected findings that may prompt further research.

Hendrik de Klerk (Dr. Tracey Carr)

From Training to Practice: An evaluation of Practice Patterns of USask's FMEM Residency Graduates

Background: The Family Medicine-Emergency Medicine residency, one-year program in addition to family medicine residency, focuses on enhancing emergency medicine skills. Our study aimed to determine a) the program goals, b) the barriers and facilitators faced by rural retention of graduates, and c) the scope and location of practice of program graduates.

Methods: We conducted virtual qualitative interviews with key informants, which were recorded and analyzed to recognize themes in interview responses. We obtained quantitative data on graduate scope and location of practice from the program director and site-leads.

Results: Program goals varied among key informants and rural exposure was the emergent theme for facilitating rural retention. Regarding location of practice, less than half of graduates are currently practicing within the province, and the regional site had the greatest proportion of graduates with a rural practice. Data for scope of practice showed that 36 of 44 (81.8%) graduates are practicing only emergency medicine, while only 5 of 44 (11.4%) graduates have a practice that includes family medicine.

Conclusion: There is a need for discussion with family medicine and emergency medicine programs to establish optimal delivery of the residency programs.

Molly Hunter (Dr. Nazeem Muhajarine)

Geographic and Socioeconomic Variation in Prenatal Opioid Agonist Therapy Access in Saskatchewan

Opioid Agonist Therapies (OAT), such as methadone and buprenorphine, are recommended during pregnancy for the treatment of opioid use disorder. The use of OAT in pregnancy has demonstrated increased access to prenatal care, increased birth weight and gestational age, and decreased rates of child apprehension by social services. This project aims to examine the ability of prenatal people to access OAT in pregnancy throughout Saskatchewan, as well as, how factors such as income disparity and number of OAT providers and healthcare facilities within an individual's Saskatchewan Health Authority (SHA) health network can contribute to OAT accessibility. The project is part of the larger Canadian Perinatal Opioid Surveillance Project and utilized HRDP-SK datasets using SAS. Postal code data points and a spatial overlay were then used to create an access heat map using ArcGIS Pro to better understand OAT prescribing and prenatal opioid use disorder based on SHA health network. The results of the study have yielded many emerging questions surrounding remote barriers, access to addictions care, and suggestions for education and policy changes related to OAT access and prescribing within the province.

Adam Hussain & Anjali Saxena (Drs. Bev Digout, Ginger Ruddy, Meredith McKague)

Learner Voices Informing Change: Updating the Undergraduate MD Professionalism Procedure to Better Support Inclusivity and Wellness

Background: Professionalism is a core competency in medical education, traditionally defined through ethical conduct alone. This may not effectively support equity, diversity, and inclusion (EDI) or learner wellness, yet research shows addressing that these gaps reduces burnout and enhances patient care.

Objective: This study evaluated how professionalism policies and procedures (PP&P) influence EDI and wellness across Canadian medical schools (CMS), and aimed to develop evidence-based recommendations for updating PP&P in medical education.

Methods: A qualitative design was used in 3 phases: Phase I involved a comprehensive review of 49 articles using PubMed, ERIC, and institutional documents. Phase II consisted of structured interviews with stakeholders from 18 CMS (ongoing). Phase III will explore student perspectives on PP&P, focusing on communication and EDI/wellness incorporation.

Results: Phase I showed multiple analytical frameworks for PP&P, evolving teaching methods, and variation in wellness/EDI integration across institutions. Phase II included 7/18 interviews identifying 6 key themes: transparency, operationalization, non-punitive approaches, longitudinal learning, collaborative development, and community-based learning.

Conclusions/Future Directions: Wellness and inclusivity are increasingly recognized as vital to professionalism, yet best practices for incorporating them in PP&P remain unclear. Phase II and III are ongoing and will provide further insight into institutional PP&P and student perspectives.

Johann Morhart (Drs. Joshua Lawson & Sharon Card)

Learning Clinical Reasoning and Evidence-Based Medicine in USask Undergraduate Medical Education: Are We Meeting Our Goals?

Background: Clinical reasoning and evidence-based medicine (EBM) are essential competencies in medical education, taught at USask through pre-clerkship Case-Based Learning (CBL) and EBM modules. Internal feedback raised concerns about inconsistent delivery and instructional alignment.

Methods: We conducted a mixed-methods program evaluation. Surveys were distributed to pre-clerkship students, small-group facilitators, and curriculum leaders to assess whether teaching aligned with intended learning outcomes. Semi-structured interviews with students and instructors explored how sessions were delivered and experienced.

Results: Surveys revealed perception gaps between students and faculty. Instructors rated the teaching of key skills significantly higher than students did, while students placed greater value on alignment between cases and other course content. Qualitative interviews identified key barriers: inconsistent facilitation, unclear expectations, poorly timed or unrealistic cases, and grading structures that discouraged exploration and reasoning development. Conversely, sessions with engaged facilitators, well-aligned cases, and supportive environments were seen as highly effective.

Conclusions: Although the CBL-EBM curriculum aligns with national educational standards, its implementation is inconsistent. Variability in facilitation, case design, and assessment limits students' ability to reliably develop clinical reasoning and EBM skills. Targeted improvements such as faculty development, clearer orientation, standardized case design, and revised assessment are recommended to better support intended learning outcomes.

Alejandra Van Dusen (Dr. Susan Petryk)

Capturing the Patient Voice: Patient Feedback in Medical Education

Patient feedback is a powerful yet underutilized tool in medical education. Traditionally, clinical skills feedback is provided primarily by physicians rather than patients or caregivers, limiting opportunities to foster person-centered skills. To address this gap, we developed and implemented a concise patient and caregiver feedback form for use in clinical skills sessions.

The form was piloted in three pediatric outpatient clinics in Regina during clerkship and resident teaching, and offered as an opt-in program for first-year medical students during pediatric encounters. Our study examined the form's impact, value, and usability from the perspectives of medical learners and caregivers.

Participants included pediatric caregivers (n=3) and medical learners (n=2). Semi-structured interviews were transcribed and thematically analyzed. Preliminary findings suggest that patient feedback enhanced learners' confidence and reinforced patient-centered behaviors. Learners expressed interest in longitudinal, constructive feedback to support development. Caregivers reported the form was quick and easy to use, valued the opportunity to contribute to learner growth, and felt comfortable providing both positive and constructive feedback, though some noted barriers related to caregiving demands.

Future directions include expanding implementation to additional clinics and specialties, incorporating the form into pre-clerkship curricula, and interviewing a larger sample of learners and caregivers.

Sundus Zia (Dr. Scott Adams)

Curriculum Innovation for Artificial Intelligence in Health Professions Education - Fostering Interprofessional Collaboration

Objective: To determine how AI is currently incorporated in undergraduate medicine, pharmacy, and nursing programs to inform curricular development.

Methods: A survey was developed regarding the integration of AI into medicine, pharmacy, and nursing programs. The survey was informed by Kern's six-step approach to curriculum development. Survey invitations were sent to a sample of undergraduate deans or equivalent in Canada and the United States. Responses were analyzed using descriptive statistics for quantitative data and thematic analysis for qualitative data.

Results: Among programs which have incorporated teaching on AI, the median number of hours dedicated to AI was 4 hours (interquartile range: 3-4). The most frequent topics were applications of AI in clinical practice (14/22 responses) and ethical implications of AI (11/22 responses). The top facilitators for integrating AI into the curriculum were faculty interest in AI (19/22 responses), student interest (14/22 responses), and increasing use of AI in clinical settings (14/22 responses). The top barriers were lack of hours in the curriculum (14/22 responses), advancements in AI occurring too quickly (12/22 responses), and information overload (14/22 responses).

Discussion: Findings from this study may inform curriculum development strategies to incorporate AI into the curriculum of medicine, pharmacy, and nursing undergraduate programs.

Tauqeer Iftikhar (Dr. Scott Adams)

Assessing the Quality of Narrative Feedback in Undergraduate Medical Education Using Large Language

Purpose: High-quality narrative feedback is critical for competency development in medical education, but its quality varies widely. This study aimed to evaluate the quality of narrative feedback in undergraduate medical education (UGME) using the Quality of Assessment for Learning (QuAL) score and explore the potential of large language models (LLMs) to automate this assessment.

Methods: A sample of 7,470 de-identified evaluations were obtained from UGME pre-clerkship clinical skills courses. Eleven trained raters scored each evaluation using the QuAL score.

Results: The median QuAL score was 2 out of 5 (IQR: 2–4). Although 70.2% of comments included a suggestion for improvement, only 36.9% of those suggestions explicitly referenced a specific observed performance, and 52.6% of all comments contained no direct evidence of the learner's performance. Seventeen percent achieved the highest score of 5, indicating some excellent quality despite the low median.

Discussion: Most feedback offered advice for improvement, however, it often lacked specificity and clear behavioral linkage, potentially limiting its educational value. Evidence of learner performance was also often insufficient. This human-rated dataset will next be used to train and validate an NLP model for automated QuAL scoring and developing a model for real-time feedback coaching.

Kate Korchinski (Dr. Sarah Donkers

'CanBestMS': Canadian MS Rehabilitation Clinical Best Practice Guideline Development Project

Access to rehabilitation is a priority for Canadians with multiple sclerosis (MS), as it improves health outcomes and quality of life. There is currently no Canadian standard of care for MS rehabilitation, as there is significant variation in access to and quality of care across the country. Evidence-based clinical recommendations are necessary to support advocacy for improved services across Canada.

Our aim is to co-develop the first guideline for symptom management and rehabilitation for individuals with MS. To ensure a high-quality guideline, our methods are informed by the Institute of Medicine and the Guideline International Network standards. A steering committee oversees the process. We follow an iterative cycle of literature synthesis and appraisal driven by topic specific working groups (e.g., fatigue). Working groups create recommendation statements, which are refined by and voted on by our Expert Panel. Our Expert Panel includes members from across Canada representing diverse expertise in MS rehabilitation, including people with MS. The resulting guideline will undergo external review. A website will be developed to help support application of the guideline. This evidence-based Canadian MS Rehab Clinical Best Practice Guideline 'CanBestMS' will be a crucial tool to inform and advance equitable access to MS rehab care.

Medical Imaging

Grace Braaten & Muhammad Awan (Drs. Jonathon Gamble & Sheldon Wiebe)

Repeat Neuroimaging in Children with Epilepsy, Autism Spectrum Disorder, Global Developmental Delay, and Cerebral Palsy Under General Anesthesia

Introduction: Magnetic resonance neuroimaging (nMRI) is frequently repeated in children with autism spectrum disorder (ASD), global developmental delay (GDD), epilepsy, and cerebral palsy (CP), despite a low incidence of new abnormalities and guidelines discouraging repeat imaging. These studies strain both MRI and anesthesia resources, and the diagnostic yield of repeat nMRI in Saskatchewan is unknown. This study evaluates the diagnostic yield, risks, and family impact of repeat nMRI under general anesthesia in these populations.

Methods: We conducted a mixed-methods study: a 10-year retrospective review of repeat nMRIs for children in Saskatchewan with ASD, GDD, epilepsy, or CP who underwent at least one anesthetized scan, and prospective caregiver interviews (ongoing) exploring caregiver expectations and burdens.

Results: The retrospective analysis demonstrated that 32.4% of repeat nMRIs were ordered against guideline recommendations and 69.1% of repeat nMRIs did not reveal new relevant findings. However, repeat scans for GDD were more likely to yield significant abnormalities. Adverse anesthesia events were uncommon, with emergence delirium (7.6%) and nausea/vomiting (0.9%) most frequent, supporting overall safety of anesthesia.

Conclusions: Improved physician education, adherence to guidelines, and thorough assessment of how the nMRI will change management may reduce unnecessary imaging, optimize resource allocation, and minimize family burden.

Vania Escarrega Valenzuela (Dr. Neha Mehta)

Evaluating the role of strain imaging in enhancing diagnostic confidence and treatment decision in cardiovascular care in Regina

Myocardial 2D strain imaging is a new echocardiographic technique which assesses myocardial strain, a measurement of cardiac tissue deformation in the cardiac cycle. One myocardial strain component, global longitudinal strain (GLS), has shown to be more sensitive to systolic cardiac dysfunction than left ventricular ejection fraction (LVEF). It is unclear in the setting of a community clinic how much Left ventricular (LV) strain is beneficial over the conventional assessment of LV systolic function with LVEF. The current study aims to associate GLS to adverse cardiovascular events compared to LVEF. A retrospective chart review of patients who underwent strain imaging from November 2024 to January 2025 at Regina Cardiology Clinic was conducted. Follow-up clinical findings over a 6-month period were analyzed by Chi-square or Fisher's exact tests for assessing group statistical differences, Cohen's kappa and correlation analyses to assess inter-rater group reliability and ROC curve analyses to associate GLS and LVEF to cardiovascular outcomes. Both GLS and LVEF showed a weak association with adverse cardiovascular outcomes, with GLS performing slightly better than LVEF. Further research with larger sample size is needed to determine the role GLS in our community setting.

Meet Patel (Dr. Scott Adams)

Impact of AI Assistance on Radiologist Follow-up Recommendations in Chest Radiography: A Secondary Analysis of the Collab-CXR Dataset

Objective: To determine whether artificial intelligence (AI) alters radiologists' follow-up and management recommendations in chest radiography.

Methods: We conducted a secondary analysis of Collab-CXR, a large multi-reader, multi-case study. Two hundred twenty-seven radiologists made 40,285 treatment/follow-up decisions across 493,710 evaluations under four randomized conditions: image only, history, AI, and history+AI. Generalized linear mixed models were used to estimate the odds of recommending treatment or follow-up.

Results: Compared with history alone, AI availability increased odds of recommending treatment or follow-up (AI-only adjusted odds ratio [aOR] 1.12, 95% CI 1.07–1.17; history+AI aOR 1.06, 1.02–1.11). AI confidence was the dominant predictor ($\geq$median vs <median aOR 15.7, 95% CI 15.1–16.27). Readers with significant prior AI experience were less likely to recommend follow-up (aOR 0.53, 0.31–0.91). Effects reversed across confidence strata: at <median confidence, AI-only and history+AI were associated with lower odds of follow-up (aOR 0.92 and 0.88); at $\geq$median confidence, higher odds were observed (aOR 1.66 and 1.56; all p<0.0001).

Conclusions: AI support measurably shifts management recommendations, with magnitude and direction shaped by model confidence and user familiarity, suggesting calibrated trust over indiscriminate adoption. Findings support deployment strategies emphasizing confidence communication and training to capture benefits while curbing unnecessary follow-up.

Eric Yu (Dr. Laura Sims)

Lunate Collapse in Scaphoiectomy with Partial Wrist Fusion

Background: Scaphoidectomy with partial wrist fusion (SPWF) treats wrist arthritis while preserving motion, but drivers of postoperative carpal collapse remain unclear.

Methods: Retrospective single-centre cohort of adults undergoing SPWF. Immediate postoperative and final PA radiographs were measured for carpal height (mm) and carpal height ratio (CHR). Primary outcome: change in carpal height; clinically significant collapse: ≥2 mm. Univariate and multivariate analyses evaluated associated patient, disease, and surgical factors.

Results: Seventy-two wrists were included (mean age 55.8 y; mean radiographic follow-up 38.2 mo). Mean collapse was 1.65 ± 1.98 mm; 31/72 (43.1%) had collapse ≥2 mm. In adjusted analyses, dominant-hand surgery and post-operative complications independently predicted greater collapse by both Δ carpal height and ΔCHR (all $p<0.05$). Several variables were significant in univariate testing but not after adjustment; notably, current smoking showed greater collapse on univariate analysis.

Conclusions: Nearly half of patients experienced ≥2 mm radiographic collapse after SPWF. Collapse appears driven by identifiable mechanical forces (hand dominance). The complications result is expected—collapse is itself a complication and may predispose to hardware penetration. Clinically, counsel higher-risk patients (dominant side), reinforce smoking cessation, and consider targeted radiographic surveillance. Limitations: retrospective single-centre study focused on radiographic outcomes.

Ismail Kamel (Dr. Steven Machtaler)

Developing Emulsion-Based Contrast Agents for Liver Metastasis Imaging using X-Ray Computed Tomography

Contrast agents play a critical role in enhancing x-ray attenuation under Computed Tomography (CT) Imaging and are used clinically to visualize the circulatory system. They generate contrast by using radiopaque elements (iodine) that absorb X-Rays which generates a detectable signal. Fenestra is a contrast agent used primarily in pre-clinical studies to visualize both the circulatory system and liver. Fenestra is directed to the liver using the ApoE/LDL-R pathway because of its size and shell composition. In this project, two different formulations were created for potential liver metastasis identification using CT imaging. DSPC-PEG formulations were created for targeting Kuffper cells to clear through the Reticuloendothelial system (RES) and was tested for liver detection. Lipidol-core based DSPC-Cholesterol formulations were tested to see if they could possess similar size properties to fenestra, allowing for similar methods of clearance. Increasing concentrations in DSPC-PEG revealed decreasing emulsion sizes to optimal 1 µm size range. In DSPC-Cholesterol, increasing lipid concentrations along with serial sonication in 9:1 lipid to Lipidol emulsions presented favorable 200-400 nm size distribution. Emulsion size analysis was supported by Multisizer/Zetasizer data and microscope scans. To allow for long-term contrast imaging in DSPC-Cholesterol formulations, further studies may incorporate SM-102 ionizable lipid into emulsion shell.

Samantha Leech (Dr. Sarah Manske)

3D Shape Modelling Reveals Structural Knee Differences in Aging and Osteoarthritis

BBackground: Structural bone adaptation contributes to pain, disability, and progression in knee osteoarthritis (KOA), yet radiographs cannot capture subtle 3D alterations. This study used weight-bearing CT (WBCT), which enables physiologic imaging under load, to quantify cortical thickness and 3D bone shape, complementary metrics of structural adaptation, as potential imaging biomarkers for KOA risk, progression, and treatment response.

Methods: Cortical thickness maps, generated with a validated cortical bone mapping pipeline, were aligned to WBCT surface masks and loaded into ShapeWorks for statistical shape modelling and cortical thickness network analyses. Analyses assessed scan-rescan reproducibility in young adults (n=29), sex differences (15 females, 14 males), age effects (15 young adults vs 19 older females), and disease effects (KOA n=8 vs age-matched controls n=8). Knees with arthroplasty, bone-on-bone contact, or poor image quality were excluded.

Results: WBCT-based modelling was reproducible. Females had thinner cortices in the trochlear and intercondylar regions and narrower mediolateral geometry. Older adults showed cortical thinning in load-bearing regions with condylar flattening. KOA cases exhibited no cortical thinning but outward condylar morphology.

Conclusion: Shape analyses revealed more structural differences than cortical thickness, particularly in KOA where morphology varied without significant thickness changes, highlighting shape as a promising imaging biomarker of structural adaptation.

Oncology

Rowen Greene (Dr. Franco Vizeacoumar)

Exploring synthetic dosage lethality within cell cycle checkpoints: Securin overexpression exposes vulnerabilities in cancer

Synthetic dosage lethality (SDL) presents a targeted means by which cells overexpressing a specific gene can be specifically targeted in cancer treatment. Securin is an important regulator of the metaphase-anaphase checkpoint within regular cell cycling that is commonly upregulated across many cancers, making it a strong target for SDL screening. This project was directed by previous bioinformatic screening done within the Vizeacoumar laboratory that identified a list of 100 securin SDL hits. Over the course of this project, a series of confirmatory colony formation assays were performed to validate these computationally predicted gene hits. The sequence of the project involved producing lentiviral vectors carrying shRNA for a gene of interest, transduction of HCT116 cells wild type and knockout securin, and analysis of the growth of each cell condition. Although poor transduction results limited the amount of data produced, future sequencing of pooled screening data will help to validate the predicted SDL interactions examined within this project.

Brooke Heinbigner (Dr. Marilyn Kinloch)

Validation of Research-Grade Folate Receptor Alpha (FRα) Immunohistochemistry and Its Association with Homologous Recombinant Repair in High Grade Serous Ovarian Cancer

Background: High-grade serous ovarian cancer (HGSC) is the most common ovarian cancer subtype, characterized by advanced-stage diagnosis and high mortality. Folate Receptor Alpha (FRα) is overexpressed in a subset of HGSC and represents a therapeutic target for emerging FRα-directed therapies. Local validation of FRα prevalence and its relationship to homologous recombination repair (HRR) status is important to guide biomarker-driven treatment strategies.

Methods: Archival specimens from 37 HGSC patients in Saskatchewan were assembled into tissue microarrays containing primary (n = 29) and metastatic (n = 32) cores. FRα immunohistochemistry was performed with a research-grade antibody and scored by intensity (0–3+) and distribution, with ≥2+ staining in ≥75% of tumor cells defined as positive. Genomic testing (n = 25) assessed homologous recombination deficiency (HRD; genomic instability score ≥ 42) and BRCA1/2 variants. Clinical and outcome data were analyzed with Fisher's exact and log-rank tests.

Results: FRα positivity was observed in 62.1% of primary tumors and 34.4% of metastases. HRD was present in 60.0% of tested cases; BRCA1/2 variants occurred in 17.4%. Median recurrence-free survival was 15 months, and two-year overall survival was 61.9%. No significant association was found between FRα expression and HRD or BRCA status.

Conclusions: FRα is expressed in a substantial proportion of HGSC, particularly in primary tumors, supporting its role in identifying candidates for FRα-targeted therapy. Reduced expression in metastases highlights the importance of testing primary specimens, while high HRD rates underscore the molecular heterogeneity of HGSC and opportunities for integrated targeted treatment approaches.

RMontana Mellor (Dr. Ibraheem Othman)

Canadian Province Presentation and Treatment related Outcomes of Angioimmunoblastic T-cell Lymphoma: A Retrospective Chart Review

Background: Angioimmunoblastic T-cell lymphoma (AITL) is a rare, aggressive peripheral T-cell lymphoma with poor prognosis and limited Canadian data. This study describes clinical features, treatment, and outcomes of AITL in Saskatchewan.

Methods: We retrospectively analyzed 30 patients diagnosed with AITL per WHO 2022 criteria. Demographics, pathology, laboratory findings, treatments, and survival were collected.

Results: The mean age was 66.7 years, with a slight female predominance (53%). Most patients (74%) presented with lymph node involvement. Immunophenotyping showed CD3 positivity in 84%, CD4 in 63%, and PD-1 in 32%. EBV positivity was 35%, consistent with global data. Bone marrow transplant was performed in 30% of cases, predominantly autologous. First-line regimens included CHOP (40%) and CHOEP (35%). Novel agents were used in 15%. Overall mortality was 76.7%, with only 23.3% alive at analysis.

Conclusions: AITL in Saskatchewan demonstrates similar demographics and poor outcomes as international cohorts. High transplant utilization reflects current treatment paradigms, but survival remains limited, underscoring the urgent need for novel therapies.

Omer Munir (Dr. Shahid Ahmed)

Survival Impact of Coexisting Diabetes in Pancreatic Cancer: A Saskatchewan Population Based Cohort Study

Background: Diabetes mellitus (DM) is both a risk factor for and a potential consequence of pancreatic ductal adenocarcinoma (PDAC). Its prognostic role remains uncertain. This study examined the impact of DM on outcomes in a population-based cohort.

Methods: We performed a retrospective cohort study of biopsy-proven PDAC diagnosed in Saskatchewan (2016–2021). Kaplan–Meier estimates were compared with log-rank testing, and Cox regression identified predictors of overall survival (OS) and disease-free survival (DFS).

Results: Among 954 identified patients, 557 were eligible; 187 (34%) had DM. Diabetic patients were older, had more comorbidities, and longer symptom duration. Surgery was performed in 91 patients, including 36 with DM. In this subgroup, DM predicted inferior DFS (7 vs. 12 months, p=0.036) and OS (17 vs. 24 months, p=0.01), with multivariate analysis confirming DM as an independent risk factor (HR 1.97, 95% CI 1.17–3.32). Chemotherapy significantly improved DFS (13 vs. 4 months) and OS (24 vs. 9 months), but completion rates were lower among diabetics (48% vs. 67%, p=0.0003). In the full cohort, chemotherapy remained the strongest determinant of survival (median OS 12 vs. 2 months).

Conclusions: Diabetes predicted worse survival after resection and reduced treatment completion. Chemotherapy conferred the greatest survival benefit, underscoring the need for tailored strategies in diabetic PDAC patients.

Lara New (Dr. Anand Krishnan)

Muscarinic Signaling and Perineural Invasion in Lung Cancer Brain Metastasis

Lung cancer (LC) is the leading cause of cancer related deaths worldwide. Brain metastasis is a severe complication that significantly worsens LC prognosis. Parasympathetic (cholinergic) signaling promotes solid cancers, including perineural invasion (PNI) of cancers, which is a risk factor for metastasis. However, their roles in lung cancer brain metastasis (LCBM) have not yet been fully investigated. In this study, we utilized western blot, Hematoxylin & Eosin staining, and immunostaining to evaluate the expression of CHRM1, CHRM3, and the incidence of PNI in patients who did and did not develop LCBM (n=24 each). We found an increased expression of CHRM1 in patients with metastasis compared to non-metastatic patients, with no significant change in CHRM3 expression found between groups. This suggests a potential role for CHRM1 signaling in promoting LCBM. We found about 12% incidence of PNI in lung cancer with 66% of the PNI positive cases being developed LCBM. This indicates that PNI may also be a major determining factor for LCBM. Overall, this study suggests that cholinergic signaling and perineural invasion may promote LCBM.

Brooke Roeges (Dr. Ibraheem Othman)

Presentation and Clinical Outcomes in Anaplastic Large Cell Lymphoma Patients Diagnosed in Saskatchewan: A Population-Based Cohort Study

Background: Anaplastic large cell lymphoma (ALCL) is a rare subtype of T-cell lymphoma accounting for 3-5% of all non-Hodgkin's lymphomas. Limited data exists for ALCL in Canadian provinces, particularly regarding rural versus urban distribution and treatment outcomes.

Methods: We conducted a retrospective population-based analysis of ALCL cases diagnosed in Saskatchewan, analyzing patient demographics, clinical characteristics, pathology, treatments, and survival.

Results: A total of 31 ALCL patients were identified, with 64.52% of cases being ALK-positive, exceeding the 31% reported in adult populations from recent international studies. Geographic distribution revealed a rural predominance, with 83.87% of patients residing in rural or other non-urban areas. Treatment analysis revealed that 71.0% of patients received intensive chemotherapy regimens, most commonly CHOEP (CHOP plus etoposide) in 27.3% of cases, followed by CHOP in 18.2%. Bone marrow transplantation was performed in 16.13% of patients, and at the time of analysis, 58.06% of patients remained alive while 41.94% had died.

Conclusion: Overall, the high proportion of ALK-positive cases (64.52%) compared to typical adult cohorts suggests potential regional variations in ALCL biology or referral patterns, while the striking rural predominance (83.87%) represents a unique geographic finding that warrants further investigation into potential environmental, genetic, or healthcare access factors.

Amina Alvi (Dr. Franco Vizeacoumar)

Exploiting Telomerase-Driven Vulnerabilities Through Synthetic Dosage Lethality in Cancer

hTERT, the gene encoding telomerase, is overexpressed in 85-90% of cancers, allowing these cancers to regenerate their telomeres and achieve cell immortality (1–3). Attempts have been made to target telomerase directly to inhibit cancer cell growth, however they have not performed well in clinical trials (4). Synthetic dosage lethality (SDL) is a concept in which simultaneous overexpression of one gene with the inhibition of another partner gene results in cell death only when both conditions are met (5). Given that telomerase is overexpressed in many cancers, it is a promising target for SDL therapy.

Previous screens in the Vizeacoumar lab identified gene GPBP1 as potential SDL partner with hTERT (6). The goals of this project were to validate GPBP1 as an SDL partner with hTERT. We hypothesized that loss-of-function of GPBP1 would cause lethality, only when hTERT is overexpressed, representing a targetable vulnerability in various cancer types. Clonogenic assays with knockdowns (KD) of GPBP1 using lentiviral shRNA were performed in hTERT overexpressing and hTERT negative cell lines, with shRFP controls. Western blots were used to verify KD efficiency. Results of these assays have validated GPBP1 as an SDL partner with hTERT, showing selective lethality in hTERT-overexpressing cell lines.

Morgan Johannson (Dr. Deborah Anderson)

Validating CREB3L1 Binding Promotor Sequences

Triple negative breast cancer (TNBC) is known for its high mortality rate and risk of relapse, which is often accredited to a lack of targeted therapies. Previous work in the Anderson lab showed that cAMP-responsive element-binding protein 3-like protein 1 (CREB3L1), an anti-metastatic transcription factor, is downregulated in metastatic TNBC cells. CREB3L1 is found in the endoplasmic reticulum and is transported to the Golgi to be cleaved into active CREB3L1 (CREB3L1*) upon exposure to stress. CREB3L1* then enters the nucleus, binding to various promoters and regulating their expression. Previously, ChIP-seq identified genes directly regulated by CREB3L1*. This experiment aimed to validate these ChIP-seq findings and determine if CREB3L1* positively or negatively regulates gene expression. The genes of interest were isolated and amplified from gDNA, then validated via RT-qPCR and luciferase dual-reporter assays. Out of the six genes tested via RT-qPCR, three (SND1, YIPF5, EDEM3) showed results consistent with ChIP-seq findings, while the other three (TUBA1B, ARF1, AKR1A1) did not. For the luciferase dual-reporter assay, two genes were examined: YIPF5, which validated the ChIP-seq result, and TUBA1B, which did not.

Jaylynn Quail (Dr. Franco Vizeacoumar)

Exploiting Securin Overexpression For Cancer Treatment

Tumour heterogeneity is a major hurdle in the killing of cancer cells, something that we are hoping to overcome through identifying key mutations across cancer cells. We believe one of these key mutated genes to be Securin, a gene involved in regulation of the cell cycle. We are aiming to target Securin through synthetic dosage lethality (SDL,) where the inhibition of one gene in combination with the upregulation of another causes cell death. This project aims to identify genes that are synthetically dosage lethal with Securin through a pooled screen occurring in 2D tissue culture, in-vivo, and in organoids. Pending the results of genetic sequencing, we anticipate that each of the pooled screens will yield overlapping results and give us a few top hits to be investigated further for synthetic dosage lethaltiy, and subsequently for mechanism and drug targetability. We are also hoping that the results of the pooled screen will show organoids and 2D tissue culture to be an appropriate substitute for mice in some situations.

Pediatrics

Andreea Ababei (Dr. Basmah Ishteiwi)

Well-appearing febrile young infants aged 90 days, a retrospective analysis of our clinical practice in Regina

Management of well-appearing febrile infants varies across emergency departments. This retrospective chart review described local practices and estimated the incidence of serious (SBI) and invasive bacterial infections (IBI) among infants ≤90 days presenting to the Regina General Hospital (RGH) Emergency Department (ED) with reported fever from July 2021 to December 2024. Descriptive statistics summarized patient characteristics; Chi-squared and Fisher tests examined associations between primary diagnosis and CRP, urinalysis, urine culture, and blood culture. Of 115 infants (median 38 days; 55.7% male), 80% were admitted. Among the 88 with a recorded diagnosis, fever-only (42.1%) and viral illnesses (37.5%) predominated; SBI occurred in 12.5% and IBI in 4.6%. CRP ≥20 mg/L occurred in 18.6% and was associated with SBI/IBI ($p < 0.001$). Urinalysis was positive in 27.9% and urine culture in 18.8%, both associated with SBI ($p = 0.011$; $p < 0.001$). Blood cultures were positive in 2.7% (E. coli; Fisher $p = 0.004$). CSF pleocytosis in 12.5% and CSF culture positive in 5.6% (Micrococcus). Length of stay was short (53.5% ≤24 h), complications were uncommon (8%), and 94.8% were stable at discharge. These
results support a guideline-aligned evaluation and provide a provincial baseline to guide implementation and quality improvement.

Dawson Holt (Dr. Paul D'Alessandro)

Parent/caregiver attitudes toward pre-pubertal testicular tissue biopsy for fertility preservation in pre-pubertal boys with cancer or undergoing hematopoietic stem cell transplant in Saskatchewan

Purpose: Prepubertal males who undergo cancer treatment or stem cell transplant are at risk of infertility in the future. While post-pubertal males can undergo sperm banking for fertility preservation (FP), there are no current clinical options for FP for pre-pubertal males. In animal models, immature testicular tissue cryopreservation (TTC) has been utilized to generate sperm used for in vitro fertilization, pregnancies, and live births. Human TTC options exist outside Canada for experimental biobanking, and there is potential to expand TTC options within Canada. In order to build an equitable national strategy, attitudes of caregivers toward TTC from less densely populated provinces need to be documented. The aims of this study were to describe attitudes of caregivers of pre-pubertal male cancer/HSCT patients diagnosed in Saskatchewan within the last five years towards TTC, and to determine willingness thresholds to potential consent to TTC.

Materials and Methods: We conducted a single centre study with caregivers of prepubertal boys with cancer or requiring stem cell transplant. A questionnaire with demographic information, a rank-order list regarding perceived barriers to TTC, and an open-ended question was administered. An additional theoretical threshold setting exercise was conducted.

Results: Fifty-two caregivers participated (response rate 85.2%; 75% female; age 36.9y; 75% White; 15.4% Indigenous; 15.4% Asian; all five income quintiles represented.) On average, caregivers endorsed willingness to accept TTC in the setting of: minimum 26% chance of infertility from underlying treatment; 29% chance of testicular biopsy complications; 18% chance of future FP use; maximum $616 annual storage cost; and maximum 7.4 hour driving time. Rank-order list of perceived barriers and responses to open-ended question suggested that caregiver attitudes were child-focused (ie: risk/benefit of procedure) rather than parent-focused (ie: travel, logistics, cost.)

Conclusions: Caregivers across Saskatchewan demonstrated interest in TTC. These results can inform efforts to expand TTC options for pre-pubertal cancer/HSCT patients locally and nationally.

Lorynn Labbie (Dr. Tim Bradley)

Impact of rural residence and low socioeconomic status on access to fetal echocardiography in Saskatchewan

Background: Congenital heart disease (CHD) is the leading cause of infant mortality due to birth defects. Prenatal diagnosis by fetal echocardiography (FE), can improve survival rates, decrease morbidity, and reduce healthcare costs. The aim of this study was to identify the impact of remoteness of residence (ROR) and lower socioeconomic status (SES) on access to FE in Saskatchewan.

Methods: Data collected included maternal indications for FE, age, place of residence, postal code, and fetal gestation at FE and CHD diagnosis. Maternal ROR and SES will be calculated using postal code, geocoding, and Chan SES index quintiles.

Results: From 1Jan2020 to 30Jun25, 700 FE were performed in Saskatoon and 338 in Regina. Indications for FE were mostly suspected CHD on obstetric ultrasound (37%), or previous family history of CHD (23%). Mean maternal age at FE was 31±6 years. Most women referred for FE lived outside of Saskatoon (65%) or Regina (48%). Mean gestation at FE was 28±5 weeks and most (56%) had a CHD diagnosis confirmed.

Conclusions: Many women in Saskatchewan live outside Saskatoon and Regina where FE is performed. Maternal ROR and SES analysis will provide a better understanding of barriers to FE access in Saskatchewan.

Marina Liu (Dr. Paul D'Alessandro)

Verbatim theatre in pediatric oncology: integration into residency education and continuing interprofessional development sessions

Hybrid (in-person and virtual) sessions, including those involving medical humanities, are increasingly ubiquitous in health professional education since the COVID-19 pandemic. Ed's Story, a verbatim play written from the journal of an adolescent/young adult (AYA) osteosarcoma patient, has been utilized in medical education at Canadian institutions for over a decade. However, we have never integrated Ed's Story into sessions for pediatric resident physicians (PRPs) or pediatric oncology healthcare professionals (HCPs). We explored how hybrid sessions using Ed's Story, combining both passive viewing of a recording of the play followed by reader's theatre (RT) of the script, impacted PRPs and HCPs working in the provincial pediatric oncology program at our tertiary children's hospital. Hybrid sessions were feasible and enjoyable; participant empathy increased post-session; and the majority of participants preferred watching the recording over RT. Inductive thematic analysis of narrative feedback identified five themes: new or broadened understanding of interdisciplinary pediatric oncology care and patient/family illness experiences; recognition of AYA care needs; appreciation for nuances of advanced communication; acknowledgement of new skills gained; and session/logistic feedback. These results will inform future iterations of Ed's Story to optimize content delivery and session structure.

Jacqueline Morris (Dr. Josh Lawson)

An investigation into the impact of childhood asthma and mental health condition multimorbidity

Background: Asthma is a prevalent chronic disease that is commonly multimorbid with neurodevelopment disorders (NDMs) including ADHD, anxiety, and depression. However, the impact of asthma-NMD multimorbidity is not well understood.

Methods: This national, longitudinal study used survey data from youth collected in 2019 and 2023. Multiple regression analysis with condition status (no asthma or NMD, asthma only, NMD only, and multimorbidity) as the independent variable was run to investigate changes in perception of health and new onset of functional difficulties.

Results: Results suggested a positive association between asthma status and the person-most-knowledgeable (PMK's) perception of the child's health (β=0.27) but increased risk of difficulty walking 500m (OR=2.14, 95%CI=1.12, 4.07). NMD status was positively associated (β=0.363) with PMK perception of child's mental health but with an increased risk of difficulty making friends (OR=3.31, 95%CI=1.90, 5.74), difficulties due to anxiety (OR=1.62, 95%CI=1.00, 2.62), and difficulty walking 500m (OR=2.12, 95%CI=1.22,3.67). Asthma-NMD multimorbidity was negatively associated with school attendance (β=-0.527) and showed an increased risk of difficulty walking 100m (OR=5.79, 95%CI=1.32, 26.2) and 500m (OR=9.45, 95%CI=3.60,24.8).

Conclusions: These results suggest that NMD and multimorbidity are more often associated with functional difficulty than asthma alone but there are some contradictory results that warrant further research.

Nada Emara (Dr. Wendie Marks)

Modeling early life adversity in Wistar rats: Exploring the effects of maternal fiber restriction on pup development and the brain

Early-life stress (ELS) can have long-term physical and cognitive health effects. In rodents, ELS can be modeled by altering maternal diet during lactation. This changes nutrient availability and microbial transfer to pups, influencing their development via the gut–brain axis. In this study, lactating Wistar rat dams were assigned to fiber-restricted (0.4% cellulose), fiber-enriched (30% cellulose), or control (5% cellulose) diets. Offspring were assessed for somatic growth, sensory and motor development, and stress-related behaviors from postnatal day 1–21. Enrichment accelerated sensory maturation, with earlier pinna detachment and eye opening compared to restriction and control. Males were more sensitive in auditory maturation, whereas females were more affected in visual maturation. For motor performance, restriction impaired righting reflex and grip strength, whereas enrichment improved righting reflex but reduced grip strength. For somatic growth, enrichment produced the greatest overall weight gain compared to restriction, though in males the opposite trend was observed. Maternal diet did not significantly affect ultrasonic vocalization counts. Overall, these findings suggest that maternal dietary fiber shapes early-life somatic, sensory, and motor development, with some effects differing by sex. Future work will examine gut microbiota, neuroendocrine markers, and adolescent cognition and stress responses to uncover underlying mechanisms.

Fabi Funes (Dr. Wendie Marks)

Effects of a Two-Hit Model of Early Life Adversity on Hypothalamic Gene Expression in Wistar Rats

Early life adversity can lead to long term physiological and neurobiological outcomes in individuals, including predisposition to psychiatric disorders such as depression and anxiety. In this study, we explored genetic changes caused by early life adversity. Bulk RNA sequencing was performed on the hypothalamus of weaning Wistar rat pups exposed to either control condition, protein restriction (PR) only, maternal separation (MS) only, or both. Differential gene expression was tested for the effects of PR, MS and their interaction. Although no genes passed the multiple testing correction, biological trends were still revealed in Gene Ontology enrichment analysis. PR enriched processes such as the kynurenine pathway, triglyceride biosynthesis, and postsynaptic neurotransmitter receptor diffusion trapping. MS enriched processes involved in microtubule and cilium organization, and cell signaling pathways including the beta-catenin-TCF complex assembly. The interaction enriched broad terms such as cell communication and system processes, which may indicate that the interaction has diffuse synergistic or buffering effects. These findings are preliminary, and may reveal molecular insight into the effects of early life adversity. Future studies should aim to confirm these results with protein assays, and assess long term effects in adult rats.

Kody Engele (Drs. Saija Kontulainen & Munier Nour)

Exploring the role of Type 1 Diabetes and fracture history on HR-pQCT outcomes in children

Compromised bone development may contribute to elevated fracture risk in pediatrics with type 1 diabetes (T1D). Evidence linking T1D and fracture history (FxHx) to bone properties remains limited. We explored the roles and interactions of T1D status and FxHx on pediatric bone properties, T1D(n=77, 60%female; mean12.0 y) and typically developing controls(TDC; n=156, 52%; 10.9 y). Grouped by T1D and FxHx: Bone properties were assessed using high-resolution peripheral quantitative computed tomography. Factor of risk was calculated. We examined main and interaction effects of T1D and FxHx on bone outcomes using MANCOVA with Bonferroni (p <.05). T1D had significant main effects on bone properties at both the distal radius and tibia (V=0.535 and 0.558, p< 0.001). FxHx had a main effect on distal tibia (V=0.135, p=0.021). No significant interactions were observed. At radius, T1D had 7–9% lower total and trabecular and 3%-14% higher cortical bone outcomes. At distal tibia, T1D had 5% lower trabecular thickness and 7% higher stiffness. FxHx had 6% lower cortical thickness and 14% higher cortical porosity. T1D had lower load to strength ratio (p=0.009) compared to TDC. T1D and FxHx showed independent associations with trabecular and cortical properties. Prospective studies are needed to confirm findings and guide interventions.

Sierra Leonard (Dr. Paul D'Alessandro)

Onco-Fertility Needs Assessment of Adolescent Young Adult Cancer Survivors in Saskatchewan, Canada

Introduction: Infertility is a major concern for pediatric and adolescent/young adult (AYA) cancer patients due to gonadotoxic treatments. Timely onco-fertility counselling and referral to fertility preservation (FP) specialists are now standards of care. In Saskatchewan, there is only one fertility clinic serving 1.2 million residents across 651,900 km². We aimed to capture the experiences of a cohort of AYA cancer survivors followed in our tertiary pediatric hospital.

Methods: Eligible patients (aged 15-39 years at study, >5 years off-treatment) completed a survey capturing demographics, experiences, and perceived barriers; medical records were reviewed retrospectively for clinical variables. Descriptive statistics were reported.

Results: Thirty-two participants completed surveys (mean age: 21.2y, range: 15.1–35.8y; 56% male; 92% cis-gendered; 69% White; 31% Indigenous/First Nations/Metis). 31% were identified as high risk for infertility. 45% recalled a fertility-related discussion as part of their cancer care (29% before treatment initiation). 28% reported a formal FP referral. Barriers to accessing FP included having to undergo additional procedures, and lack of procedure options (e.g., pre-pubertal at diagnosis).

Conclusions: Historic rates of onco-fertility counselling and FP referral were low. These data can serve as a baseline to measure practice changes in onco-fertility care in Saskatchewan.

Quality Improvement

Veronica Nguyen (Drs. Katelyn Halpape, Amy Soubolsky, Annabelle Wanson)

Saskatchewan Psychiatrists' and Psychiatry Residents' Perspectives on Aripiprazole and Brexpiprazole Use in Major Depressive Disorder

Background: About 14% of Canadian will experience major depressive disorder (MDD) during their lifetime. Partial dopamine agonist antipsychotics (i.e., aripiprazole and brexpiprazole) are first-line adjunctive pharmacotherapy for difficult-to-treat depression in the 2023 Canadian Network for Mood and Anxiety Treatment guidelines. These medications are not covered for MDD on the Saskatchewan Drug Formulary.

Objectives: As part of an advocacy initiative for their inclusion on the formulary, our project aims to assess the perspectives of Saskatchewan-based psychiatrists and psychiatry residents regarding the use of aripiprazole and brexpiprazole for MDD.

Methods: A cross-sectional, self-directed, online survey was conducted. The questionnaire included selection-based and open-ended questions.

Results: Forty-three participants completed the survey (response rate of 23% (43/190)). Approximately forty percent of respondents prescribe aripiprazole and brexpiprazole for MDD in half of patient cases when indicated (15/42). Most respondents view aripiprazole and brexpiprazole as being more effective and better tolerated compared to other adjunctive treatments. The number one barrier to prescribing both is a lack of coverage.

Conclusion: Saskatchewan psychiatrists understand the role of aripiprazole and brexpiprazole for MDD treatment; however, Saskatchewan residents are unable to access these medications due to formulary restrictions. These findings will support advocacy initiatives for provincial coverage.

Sameer Ahmad (Dr. Eric Sy)

Evaluation of Patient, Family, and Provider Perspectives on Family Rounds and Patient- and Family-Centered Care in Regina ICUs

Background: Patient- and family-centered care (PFCC) is a core value of the Saskatchewan Health Authority. Regina ICUs adopted open family presence and encouraged family participation in multidisciplinary rounds in 2016, yet surveys show many patients and families still feel uninvolved. Understanding local experiences is essential to strengthen PFCC.

Methods: A qualitative study was conducted in the Regina General and Pasqua ICUs (June–July 2025). Semi-structured interviews were completed with patients admitted ≥48 hours, family members who attended ≥1 round, and providers directly involved in ICU care. Interviews were recorded, transcribed, and analyzed using inductive thematic analysis (NVivo 15).

Results: Nine participants (2 patients, 3 family, 4 providers; median age 44) were interviewed. Four themes were identified: communication gaps and unclear roles (7/9, 78%); emotional and psychological strain (6/9, 67%); inconsistent inclusion and structure of rounds (5/9, 56%); and systemic/environmental challenges (5/9, 56%). Patients described vulnerability and reliance on nurses, families reported exclusion, and providers cited operational constraints.

Conclusion: Clear explanations and inclusion in rounds fostered trust and partnership, yet communication gaps and exclusion limited decision-making. Standardized checklists, plain-language summaries, and structured notifications could improve transparency. Patient navigators or family liaisons may prepare families for rounds, while explicit prompts for input during care planning could advance shared decision-making in the ICU.

Ainsley Bristol (Dr. Niels Koehncke)

Effect of Microbreaks on Perceived Discomfort of Veterinary Workers Performing Abdominal Ultrasonography

Musculoskeletal symptoms related to work activities are reported by 65-91% sonographers imaging human patients, yet little is known about risks in veterinary ultrasonography. A 2024 study identified a significant risk of musculoskeletal injury to veterinary ultrasonographers performing abdominal ultrasounds. To address this concern, a microbreak training intervention was implemented in 2025. The current study investigated the effect of short, intentional breaks, termed microbreaks, on the perceived discomfort of veterinary workers performing abdominal ultrasounds. Sixty-five videos of a convenience sample of veterinary sonographers were analyzed using Inseer, an AI-powered ergonomics software. Microbreak intervention was randomized by pair of procedures. Qualitative interviews were conducted to explore the workers' experiences with microbreaks. Consistent with the 2024 study, an elevated risk of musculoskeletal injury was identified in all ultrasound sessions. Of note, the liver and right adrenal gland were the most high-risk organs to scan. Our findings suggest that veterinary sonographers incur a risk of musculoskeletal injury related to their work. Furthermore, a microbreak intervention, when employed in the proper context, provides subjective benefits in reducing discomfort without interrupting workflow.

Zoe Douglas (Drs. Jacob Alhassan & CharleneThompson)

Implementation of a Patient Oriented Ovarian Cancer Folate Receptor Report: A Scoping Review Protocol

Background: Folate receptor alpha (FRα) is an emerging biomarker for ovarian cancer detection and shows promise for identifying targeted pharmacologic treatment approaches to the disease. Patients are expected to understand complex information, compare treatment methods, and make treatment decisions based on their own understanding and personal values. This expectation makes limited health literacy a major barrier to improving cancer care globally. Despite patients having unprecedented access to their medical records, they are not the primary target of these reports. Improving readability of medical reports enhances patient understanding of their care, ultimately supporting better health outcomes.

Objective: The aim of this study is to develop a patient-centered clinical report that clearly communicates the FRα level with a holistic understanding of the results and its implications. Developing a patient-centered reporting tool ensures patient participation through informed decision-making.

Methods: A scoping review is being conducted to identify existing research on patient-centered reporting strategies and effective communication of clinical results. The findings will inform the design of a prototype report tailored to patient needs.

Research Questions:
1. What is patient engagement/participation/involvement in communicating written lab/clinical results
2. What is the recommended information communicated to patients about clinical results?

Claire Douglas (Dr. Sarah Smith)

Multidisciplinary Management of Placenta Accreta Spectrum Disorders

Objective: To compare maternal and neonatal outcomes before and after the implementation of a multidisciplinary management team for placenta accreta spectrum (PAS) disorders.

Methods: This retrospective cohort study reviewed pregnancies complicated by PAS disorders that culminated in delivery at the Regina General Hospital between January 2019 and December 2024. Patients were categorized by delivery date before (n = 15) or after (n = 22) implementation of the team.

Results: The post-implementation group received fewer units of transfused PRBCs (2 vs. 4, p = 0.175), had higher hemoglobin at discharge (89.14 g/dl vs. 87.93 g/dl, p = 0.839), fewer ICU admissions (2 vs. 4, p = 0.198), and a shorter postoperative hospital stay (3 vs. 4 days, p = 0.094), but these differences lacked statistical significance. General anesthesia was used more frequently post-implementation (59% vs. 27%, p = 0.061). After implementation, neonates had lower Apgar scores at 1 minute (4.68 vs. 6.40, p = 0.061), 5 minutes (6.73 vs. 8.27, p = 0.025) and 10 minutes (6.33 vs. 8.50, p = 0.045) but the neonatal cord arterial pH was similar (7.30 vs. 7.28, p = 0.413).

Conclusion: Our findings support the use of a multidisciplinary team for managing PAS disorders.

Davidson Fadare (Dr. Abdalla Butt)

Does a Pooled Referral System Improve Wait Times for Patients Awaiting Vascular Surgery?

Introduction: Delays in Vascular Surgery can negatively impact patient outcomes. In January 2025, Regina's Vascular Surgery Group introduced a pooled referral system where referrals are triaged by urgency and assigned to the next available surgeon. This study evaluated the impact of the system on various wait times.

Methods: A retrospective chart review was conducted on 181 patients referred to vascular surgery during two time periods: Sept - Nov 2024 (pre-implementation) and Mar - May 2025 (post-implementation). Referral source (Family Medicine (FM) vs. non-FM) and location (urban vs. rural) were included. Wait times from referral-to-consult, consult-to-surgery, and referral-to-surgery was analyzed.

Results: Referral to consult times significantly improved post-implementation (M = 37.7 (SD = 35.1) vs. M = 106 days (SD = 145), p = 0.046). However, rural patients waited significantly longer than urban patients for referral to consult (50.3 vs. 34.4 days, p = 0.022) and referral to surgery (44.8 vs. 30.1 days, p = 0.045) times. FM referrals also had significantly longer waits than non-FM for referral to consult (45.1 vs. 24.9 days, p = 0.017) and referral to surgery (48.8 vs. 25.6 days, p = 0.031) times.

Conclusion: The pooled referral system improved timely access from initial consult to vascular care. However, rural patients and those referred by FM faced longer wait times, indicating a need for further changes to promote equitable access to vascular surgical care.

Sharon Jacob (Dr. Annette Epp)

Saskatoon's Pelvic Floor Pathway; What are Surgical Referral Rates?

The Saskatchewan Pelvic Floor Pathway is a publicly funded provincial program providing education, assessment, and conservative treatment for women with pelvic floor disorders[1]. The program established 2012 emphasizes an evidenced-based multidisciplinary, conservative approach for patients[1-5]. We conducted a retrospective chart review of patients referred to the Pathway between 2018–2019. We tracked surgical procedures for this group of patients until August 2025. Our total cohort included 1790 patients, 110 of whom had surgery referrals from the Pathway to a surgical provider and 1680 who did not. Among 110 surgical referrals, 42% had surgery, the breakdown as follows: 57% prolapse repairs, 33% incontinence procedures, 9% surgery for both incontinence and prolapse, and 2% "other procedure(s)". Among patients without surgical referral (1680), 122 patients (7.3%) eventually had surgery over the next 6 years: 35% incontinence, 33% prolapse procedures, 10% surgery for both incontinence and prolapse, 22% "other procedure(s)". These results highlight differences in surgical rates and type of surgery between the groups and provide data into the effectiveness of this pathway model. This information could promote similar programs in other provinces across Canada to create a comprehensive plan to tackle Pelvic Floor disorders and hopefully decrease surgical rates.

Jasmin Ogren (Dr. Jackie Perrot)

HIV Post Exposure Prophylaxis (PEP) Prescribing in Saskatoon Emergency Departments: Pre and Post CME Intervention

Introduction: Saskatchewan has the highest incidence of HIV in Canada, driven by inequities that disproportionately affect Indigenous peoples and those in rural and northern communities. HIV post-exposure prophylaxis (PEP) prevents HIV and must be initiated within 72 hours of exposure. Emergency departments (EDs) are often the first point of care following sexual assault or needlestick injury. As coverage for PEP required approval by an ID specialist or Designated ARV Prescriber, CME was developed to onboard ED prescribers.

Methods: A retrospective pre-post chart review evaluated the impact of a CME intervention for ED and Sexual Assault Response Team physicians on PEP prescribing in Saskatoon EDs. 625 charts met inclusion criteria: patients ≥16 years presenting after sexual assault or blood/body fluid exposure.

Results: PEP prescribing for high-risk exposures increased from 61% pre-CME to 82% post-CME (p = 0.0126). In sexual assault cases, PEP prescribing increased from 38% to 73% (p=0.0054), acknowledgement of PEP increased 57% to 90% (p=0.0015), and cases not acknowledged decreased from 43% to 8% (p =0.0005).

Conclusion: Targeted CME enables appropriate PEP prescribing, reducing reliance on specialist prescribers. High-risk prescribing improved significantly, particularly following sexual assault. CME strengthens HIV prevention at the point of care and improves access.

Tanish Patel (Dr. Lalenthra Naidoo)

Referral Letter Quality in Canadian Otolaryngology: A National Survey

Objective: Accurate triaging and patient prioritization rely on "good" referral letters. However, quality varies widely across practice settings and providers. Despite high referral volumes, little is known about Canadian otolaryngologists' satisfaction with the referral letters they receive. This study evaluated their satisfaction, regional and subspecialty differences, and opportunities for improvement.

Methods: This survey was reviewed and approved by the University of Saskatchewan Behavioural Research Ethics Board (BEH#5300).

The national survey was developed on REDCap and distributed to all active members of The Canadian Society of Otolaryngology (CSO); responses were filtered for staff physicians. Likert scales and open-ended questions were used to quantify overall satisfaction and identify common themes. Responses were analyzed using descriptive statistics and thematic analysis for identification of common themes.

Results: 78% of respondents reported triaging delays or workflow disruptions due to incomplete referrals. Clinical contextual details such as urgency, prior investigations, and relevant comorbidities were frequently absent. Urgency interpretation differed by referral source. 59% of participants supported standardization.

Conclusion: Inconsistent referral content creates significant inefficiencies for Canadian otolaryngologists. Strong support for standardization suggests that implementing templates could reduce delays, harmonize urgency interpretation, and streamline patient prioritization to improve efficiency and clinical outcomes along the care pathway.

Memoon Qureshi (Drs. Colin Gebhardt & Sabira Valiani)

Improving Pain Recognition in Saskatchewan ICUs

Pain is one of the most common and distressing symptoms in the ICU, with up to 79% of patients reporting moderate to severe pain. Sedated or non-communicative patients also experience pain, and untreated pain has been linked to higher mortality among other consequences. The PADIS guidelines recommend structured and multimodal strategies for pain assessment, with validated behavioral tools such as the Critical-Care Pain Observation Tool (CPOT) for patients unable to self-report.

This quality improvement project evaluated baseline CPOT documentation practices in Saskatoon ICUs to identify opportunities for improvement. Using a modified REDCap tool, we collected data on the frequency of CPOT assessments, appropriateness of omissions, and variability across day and night shifts.

Across 553 assessment opportunities, between 30%-60% were omitted without valid justification. These errors were vastly different between day and night shifts and constituted the primary barrier to reliable pain recognition.

This baseline assessment highlights inadequate CPOT documentation, leading to under-recognition of pain in critically ill patients. Quality improvement efforts will focus on standardizing CPOT use, integrating prompts into workflows, and providing targeted staff education, with the aim of increasing documentation completeness and reducing inappropriate omissions.

Shawn Silver (Drs. Zachariah Mansour & Sabira Valiani)

Driving Quality Care with Quality Improvement: Developing Quality Improvement in Saskatoon's ICUs

Introduction: Intensive care units (ICUs) face significant challenges in standardizing patient care and monitoring outcomes for high-risk conditions. This project explored the need for a Quality Improvement (QI) program and a data-driven approach to enhance patient care and outcomes in Saskatoon ICUs.

Methods: A prospective QI methodology was utilized, employing a data collection tool built on RedCap. The data collection focused on key metrics, including patient acuity scores (APACHE II and SOFA), length of stay (LOS), and mortality rates. A driver diagram was developed to provide a clear strategic framework linking the project's aims to actionable change ideas.

Results: This project demonstrates the need for a QI program in Saskatoon ICUs to standardize care, enhance data systems, and establish quality performance to facilitate benchmarking. The driver diagram provides a strategic plan, and early acuity, length of stay, and mortality data establish useful baselines. Collecting 600 chart reviews over 220 hours exposed inefficiencies and errors with manual data entry.

Conclusion: The project presents a compelling argument for implementing a comprehensive QI program in Saskatoon ICUs and promoting the adoption of EMR. It highlights the potential for using a systematic, data-driven approach to standardize care, reduce practice variation, and improve patient outcomes.

Rayan Shafi (Dr. Bindu Nair)

Osteoporosis Clinical Practice Guideline Concordance in Saskatchewan

Background: 2.3 million Canadians are living with osteoporosis. Osteoporosis Canada published revised clinical practice guidelines in 2023 that described pharmacological management based on low, moderate, or high FRAX score. The adherence to the guidelines in Saskatchewan is currently unknown.

Methods: The subjects include patients who have completed a bone mineral density (BMD) test in Saskatoon and had a hospitalization between 2023 and 2024. 262 patient hospitalization charts and imaging reports were retrospectively analyzed to obtain data points on the patient identification, risk factors for osteoporotic fracture, FRAX score, and active prescriptions. Patient FRAX scores were compared to active prescriptions.

Results: 68% patients were female, and 12% belonged to rural communities. 17% in the low FRAX score group were prescribed pharmacotherapy, contrary to guidelines. 38% in the high FRAX score group were not prescribed pharmacotherapy, contrary to guidelines. There was a weak correlation between the number of risk factors and the probability of receiving pharmacotherapy in the moderate FRAX score group.

Conclusions: The results highlight gaps in osteoporosis management in the province. Inconsistent adherence to management guidelines is noted regardless of FRAX scores. These findings will identify areas for improvement in provincial osteoporosis care and improve outcomes for patients with osteoporosis.

Ayeh Aldulaymi (Dr. Rick Jaggi)

A Prospective Analysis of Patients with Nonflaccid Facial Paralysis Undergoing Chemodenervation versus Selective Neurectomy

Background: Nonflaccid facial paralysis (NFFP) with synkinesis impairs function and quality of life. Botox is effective but temporary, selective neurectomy targets durable reduction of co-contraction. Prospective patient-reported comparisons are not reported.

Methods: We conducted a single-centre prospective pilot. Adults with NFFP received selective neurectomy (n=3) or botox (n=2). The Synkinesis Assessment Questionnaire (SAQ; 9 items, higher=worse) was collected at baseline, selective neurectomy patients were reassessed immediately post-op. Primary tests were Wilcoxon signed-rank (within neurectomy) and Mann-Whitney U (between groups).

Results: In selective neurectomy, mean SAQ fell from 3.00 to 2.33 ($\Delta=-0.67$; ~22%); 2/3 improved and 1/3 was unchanged. The change was not significant (Z=−1.34, p=0.18). Baseline SAQ was higher in selective neurectomy than botox (U=0.0, p=0.08). Comparing botox baseline with selective neurectomy post-op approached significance (U=0.0, p=0.053). Item-level trends showed reduced peri-orbital co-contraction, with persistent gustatory lacrimation in some.

Conclusions: Immediate post-op findings show directionally favourable change after selective neurectomy but no statistical significance in this underpowered pilot. Because recovery in NFFP is time-dependent (edema resolution, reinnervation, rehabilitation), immediate assessment likely underestimates benefit. Ongoing 3-monthly follow-up to 18 months will define trajectories, refine effect sizes, and clarify the roles of durable selective neurectomy versus repeat botox in patient-centred care.

Caleb Hammond (Dr. John Shaw)

Cystic Duct Closure Devices Remain Competent Beyond ERCP-Generated Pressures

Gallstones are a prevalent and costly disease in Canada, often requiring gallbladder removal (cholecystectomy). During the operation, the cystic duct is ligated to prevent bile leakage into the abdomen. Since the intraluminal biliary pressures are relatively low, the closure device used is left to the surgeon's preference. However, post-operative complications, such as recurrent stones, can be treated with endoscopic retrograde cholangiopancreatography (ERCP), which can raise the pressures to 150 mmHg, according to a recent study. For this reason, surgeons are hesitant to perform ERCP soon after surgery. This study tested the competency of various commonly used cystic duct closure devices and compared them against the reported maximum ERCP-generated pressure. Using IV tubing, we examined the capacity pressures of various closure devices. We also used swine gallbladders and bile ducts to determine the burst pressure of the biliary system when
the cystic duct is ligated. Our results suggest that metal and plastic (Hem-o-lok) clips have capacity pressures beyond the maximum ERCP-generated pressures. Moreover, high pressures are more likely to rupture the biliary system than cause device failure. Overall, our data indicates that a secure and properly placed device should mitigate the hesitancy to perform a post-operative ERCP.

Nicolas Henao (Dr. Peter Hedlin)

Postoperative cognition in elderly patients, is there an association with their preoperative baseline?

Background: Cognitive deficits following surgery such as perioperative cognitive disfunction (POCD) and post-operative delirium (POD) are common post operative complications among older adults. The etiology of these conditions has been associated with socioeconomic as well as biological factors. Therefore, this study aimed to examine the risk factors associated with cognitive decline after surgery.

Methods: The study cohort consisted of 25 elderly patients (≥60 years of age) who underwent preoperative consultation at the Pre-Assessment Clinic at the Royal University Hospital (RUH). Patients completed the Montreal Cognitive Assessment (MoCA) as well as the Edmonton Frailty Scale (EFS). Following surgery, they were reassessed with an alternate version of the MoCA and the Confusion Assessment Method (3D-CAM and CAM-ICU). Finally, a retrospective chart review was conducted for each patient.

Discussion: This study demonstrates that elderly surgical patients experience significant postoperative declines in global cognition as well as in delayed recall. Preoperatively, higher frailty was associated with poorer cognitive performance, as measured by MoCA, suggesting that frailty is an important predictor of baseline cognitive vulnerability. These findings highlight the need for preoperative frailty and cognitive screening to identify at-risk patients and to guide perioperative management strategies aimed at reducing postoperative cognitive dysfunction.

Matthew Jarotski (Drs. Satchan Takaya, Cara Spence, William Dust, Lee Gallant

Antibiotic management of prosthetic joint infections: review of current state and development of a clinical treatment pathway

Prosthetic joint infection (PJI) is a serious complication of arthroplasty, traditionally managed with prolonged intravenous (IV) antibiotic therapy (1,2). Recent evidence, including the OVIVA trial, has shown that highly bioavailable oral antibiotics are non-inferior to IV therapy, while reducing line-associated complications (3). The primary objective of this study was to evaluate current management of PJIs in Saskatoon and to identify how many patients would have been eligible for early transition to oral antibiotics. A retrospective review of patient charts with PJI was conducted, of which 148 met eligibility criteria. Based on culture results and antibiotic susceptibility, 79 patients (53.4%) were deemed appropriate candidates for an early oral step-down regimen. The secondary objective was to develop a clinical practice pathway to guide eligibility for oral therapy. The pathway utilizes local microbial antibiograms, and emphasizes surgical source control, organism susceptibility, and patient-specific considerations, aligning with recent consensus statements supporting oral therapy in selected patients (4,5,6). The results demonstrate that while over half of patients could be managed with early oral therapy, it remains underutilized locally. Implementation of a standardized pathway may reduce treatment burden, prevent catheter complications, reduce healthcare admission duration, and harmonize local practice with current international evidence for antibiotic management of PJIs (3,7,8,9).

Benjamin Katz (Dr. Michael Kelly)

Normobaric Hyperoxygenation in Conjunction with Reperfusion Therapy for Acute Ischemic Stroke: A Systematic Review and Meta-Analysis

Introduction: Acute ischemic stroke (AIS) is a leading cause of disability and death. While reperfusion therapies (intravenous thrombolysis and endovascular thrombectomy) restore blood flow, outcomes remain poor. Normobaric hyperoxygenation (NBO), non-invasive delivery of high-concentration oxygen, may preserve the ischemic penumbra as an adjunct to reperfusion.

Methods: We conducted a PROSPERO-registered review (CRD420251065883) following PRISMA 2020 guidelines. MEDLINE, EMBASE, CENTRAL, Scopus, and Web of Science were searched to June 2025. Five studies (four randomized trials, one cohort; 792 patients) were included. Random-effects meta-analyses were performed, with risk of bias assessed using RoB2/ROBINS-I and certainty with GRADE. Outcomes included early neurological improvement (NIHSS), functional outcome (mRS), mortality, infarct volume, symptomatic intracranial hemorrhage (SIH), and adverse events.

Results: NBO improved NIHSS at 24h (MD -1.45, 95% CI -2.75 to -0.16), reduced infarct volume (MD -17.6 mL, 95% CI -26.6 to -8.6), and improved functional independence at 90d (OR 2.10, 95% CI 1.23–3.56). Other outcomes favored NBO but were not statistically significant. No increase in SIH or adverse events was observed.

Conclusion: Adjunctive NBO may improve neurological recovery, functional independence, and reduce infarct volume, without increasing risk of adverse events in AIS.

Mark Sabau (Dr. Gabriela Campos-Baniak

Selective Laser Trabeculoplasty as Primary Glaucoma Treatment in Community Practice

Background and aims Glaucoma, the leading cause of irreversible blindness, is primarily managed by reducing elevated intraocular pressure (IOP). Traditionally, medical therapy has been first line treatment for elevated IOP, and selective Laser Trabeculoplasty (SLT) has been adopted an as alternative option. This study aims to evaluate the effectiveness of SLT in reducing IOP in treatment-naïve patients.

Methods: Single center retrospective design to evaluate effectiveness of SLT in treatment-naïve patients.

Results: After one round of SLT, 48% of patients achieved target IOP. A second round of SLT increased efficacy by 12%, raising total success to 60%. Type and severity of glaucoma were significant predictors of response ($p<0.05$). Primary open angle glaucoma and ocular hypertension had higher success, while pseudoexfoliation syndrome, pseudoexfoliation glaucoma, advanced diseases were more likely to fail.

Conclusion: SLT is a safe and effective first-line treatment in reducing IOP in treatment naïve patients, particularly in early disease. This may be especially useful for rural patients where regular monitoring and follow up can be challenging. SLT has also demonstrated greater cost-effectiveness compared to contemporary IOP-lowering drops, offering drop independence, lowering the need for glaucoma surgery, and carrying a very low risk of adverse events.

Syed Subhan (Dr. Jordan Buchko)

Impact of Targeted Educational Intervention on Codeine Prescriptions in Orthopedic Surgery: A Pre- and Post-Intervention Analysis Quality Improvement Project.

IIntroduction: Effective postoperative pain management is essential in orthopedic surgery; however, some ordering practices pose risks without clinical benefit. A prevailing issue is the use of Tylenol #3 (T3) which is codeine with acetaminophen in combination with other opioids. Evidence shows this practice does not improve pain control and instead increases the risk of opioid-related side effects.

Methods: A quality improvement (QI) project was conducted at Regina General and Pasqua Hospitals in three phases. Baseline data on T3 co-ordering with other opioids were collected retrospectively from February - April 2025 using the BDM system and PAR tool. On June 4, 2025, an educational intervention was delivered to orthopedic surgeons with audit-feedback, and there also education sessions for orthopedic nurses. A post intervention data collection was done covering June-August 2025 to assess changes in ordering patterns.

Results: During the baseline period, 186 prescriptions were identified where T3 was ordered alongside another opioid. Post-intervention, this decreased to 131 prescriptions, representing a reduction of 50 orders.

Conclusion: The intervention demonstrated that targeted education and audit-feedback can meaningfully reduce unnecessary T3 ordering. Continued reinforcement through future Plan-Do-Study-Act cycles may further align practice with evidence-based standards, reducing opioid exposure, and enhancing patient safety.

Rishi Vakulabharanam (Dr. Daryl Fourney)

Comparing Error Types and Rates of X-Ray and O-Arm Guided Pedicle Screw Placement

In neurosurgical procedures, placement of pedicle screws is guided by either X-ray or O-arm intraoperative imaging. Different breaches occur during this with respect to distance outside of the pedicle and direction of breach. Medium/high grade breaches (>2 mm) and anterior breaches are the most impactful on patient outcomes. To assess the difference between these two modalities, post-operative CT scans were performed to assess accuracy and errors. This was compiled alongside information about operating times, revision rates, and post-operative complications. This study included a retrospective analysis of 208 patients (1137 screws). There were 82 patients (426 screws) in the X-ray Group and 126 patients (711 screws) in the O-arm Group. Breaches were stratified by direction and severity. X-ray guidance showed a higher rate of anterior breach and medium/high grade breaches, but O-arm guidance showed a higher rate of overall breach, and a higher rate of low-grade breach. However, these low-grade breaches are not associated with an increased risk of neurological deficits. Based on these findings, O-arm guided pedicle screw placement is superior to X-ray guidance with respect to error rates and types. In the future, a larger population will be analyzed for operative time, complication rate, and revision rate.

Hannah Verity (Dr. Angelica Lang)

Scapular kinematics after wrist fusion: comparing to matched controls

Total wrist fusion is a surgical procedure commonly used to manage pain in late-stage rheumatoid arthritis, though it results in a complete loss of wrist mobility. This loss can lead to compensatory movement patterns in other upper limb joints, which may increase the risk of secondary musculoskeletal disorders. This study investigated scapular kinematics in wrist fusion patients compared to healthy controls. The hypothesis was that wrist fusion patients would demonstrate increased scapular motion to compensate for their wrist immobility.

Sixteen participants (8 wrist fusion patients, 8 age and sex matched controls) were recruited. Scapular motion was tracked using motion capture during seven functional tasks. Scapular angles (upward rotation, internal rotation and anterior tilt) were analyzed at 30 ° increments of humeral elevation. Between-group differences were assessed using independent t-tests.

Compared to the control group, wrist fusion participants demonstrated significantly greater scapular internal rotation during the comb hair task, greater anterior tilt during the tie apron task, and greater upward rotation during the overhead reach task. These findings suggest that scapula kinematics are altered to compensate for wrist immobility. Understanding these compensatory patterns is important to guide post-surgical rehabilitation strategies and help prevent secondary upper limb injuries.

Psychiatry

Mackenzie Enweani (Dr. Jacob Alhassan)

We cut the legs off people, and then we blame them that they don't access things: Transportation as a missing link to accessing substance use services in Saskatchewan

Saskatchewan's major intercommunity travel option, the Saskatchewan Transportation Company (STC), had been a vital mobility link to over 200,000 citizens every year before its abrupt closure in 2017. Comprised of 41 buses connecting 253 communities, this closure had serious implications for those in Saskatchewan who are unable to transport themselves. Unreliable access to transportation has been cited as the most commonly documented / reported non-medical barrier to clients seeking substance use disorder (SUD) and mental health outpatient services - reinforcing our concern for a lack of a transportation system.3 This qualitative study interviewed 11 service providers and stakeholders, where five major transportation barriers to accessing SUD treatment in Saskatchewan were identified and expressed as ROAD+S: Relationships with others and the community, Ongoing lack of accessible public transportation, Ability of public transportation to provide safe transportation for all, Difficulty with immediate same day transportation, and Stigmatization. These barriers scratch the surface of issues surrounding transportation and its role in accessible SUD care. Expanding upon existing services but tailoring them to better support those seeking SUD treatment is a strengths-based way to begin to improve transportation options for patients in Saskatchewan.

Zainab Hassan (Dr. Evyn Peters)

Mood Instability, Impulsivity, and Self-Harm in Young Adult Psychiatric Inpatients

Background: Mood instability and impulsivity are transdiagnostic constructs associated with many psychiatric disorders and self-harm/suicide. There is a clear relationship between mood instability and impulsivity in patients with mood and anxiety disorders. This study examined the effects of these traits on self-harm.

Methods: Self-report questionnaires were completed by 52 young adult psychiatric inpatients. Mood instability and impulsivity were assessed with short versions of the Affective Lability and UPPS-P Impulsive Behaviour Scales. Anxiety-related traits were also measured, namely intolerance of uncertainty, anxiety sensitivity, fear of negative evaluation, and repetitive thinking. The Self-Harm Inventory was used to assess lifetime self harm. Sequential regression was used to identify traits with unique effects on self-harm.

Results: Mood instability was the strongest correlate of lifetime self-harm, and the only significant predictor of past suicide attempts. Of the impulsivity-related traits, only lack of premedication had a significant effect on self-harm that was independent of mood instability. Fear of negative evaluation and repetitive thinking were also associated with self-harm, but these effects were no longer significant after controlling for mood instability.

Conclusions: The results suggest unique effects on self-harm via mood instability and impulsivity. Future research on personality and self-harm should consider both traits simultaneously.

Areel Nasir (Dr. Llyod Balbuena)

Using RI-CLPM Modeling to Investigate the Links between Smoking and Mental Health

IBackground: Cigarette smoking and mental health problems such as depression and anxiety frequently co-occur in adolescence, but the directionality of this association remains unclear. A systematic review by Chaiton et al. reported evidence for a bidirectional relationship yet noted that most longitudinal studies relied on standard regression or basic cross-lagged models. These methods cannot fully separate stable individual differences from dynamic within-person changes, limiting causal inference.

Objective: This project sought to address these limitations by reviewing the literature on smoking and mental health and proposing advanced statistical methods to clarify temporal pathways.

Methods: A comprehensive literature review summarized epidemiological evidence, theoretical models, and analytic gaps. Building on these findings, we highlight the application of random intercept interval (cross-lagged) analysis which partitions variance into stable between-person traits and within-person processes, improving the estimation of directional effects.

Results: Prior studies consistently demonstrate a complex, likely bidirectional relationship between smoking and mental health. Shared vulnerabilities such as genetic predisposition, neurobiological mechanisms, and environmental stressors contribute to this interplay. However, inconsistencies in effect sizes and causal interpretations reflect analytic limitations.

Conclusions: By applying more advanced statistical analyses which has been a limitation of prior research in the field, this project extends current knowledge and advances understanding of how smoking and mental health influence each other over time, providing insights for targeted prevention and early intervention in adolescents.

Adam Hussain (Dr. Scott Adams)

SAFIRE-MH: Structured Assessment Framework for Inclusive and Responsible Evaluation for Generative AI Mental Health Chatbots

Background: Large language models show promise in healthcare but remain reactive, producing single-turn responses. Agentic AI systems, such as LifeLine, incorporate adaptive learning, memory, and personalized support, which current evaluation frameworks cannot accurately assess.

Objective: This study aimed to develop SAFIRE-MH, a comprehensive evaluation framework for agentic AI mental health chatbots that assesses both traditional LLM characteristics and unique agentic capabilities, then evaluate LifeLine across all framework domains.

Methods: A mixed-methods approach was employed in three phases: Phase I involved a comprehensive literature review to identify gaps in current frameworks. In Phase II we developed SAFIRE-MH to integrate traditional chatbot and agentic characteristics, with quantifiable scoring methods grounded in prior frameworks. Phase III will operationalize the framework using 100 scenarios to evaluate and benchmark LifeLine.

Results: Phase I identified that current frameworks do not accurately evaluate agentic functions. Phase II developed SAFIRE-MH's 9-domain framework integrating Traditional Chatbot Characteristics (crisis detection, empathy, clinical appropriateness, privacy, professional referral) and Agentic AI Characteristics (multi-agent coordination, long-term memory, proactive support, adaptive learning).

Conclusions/Future Directions: SAFIRE-MH represents the first comprehensive evaluation framework designed specifically for agentic AI mental health systems. Phase III will evaluate LifeLine, establishing evidence-based recommendations for agentic AI use in mental healthcare.

Jack Walther (Dr. Darrell Mousseau)

Cross-linking experiments support a physical interaction between the depression-related serotonin transporter and the Alzheimer disease-related β-amyloid peptide

Alzheimer's disease has been shown to cause an intracellular accumulation of toxic β-amyloids (Aβ) . While it is still unknown how, this accumulation may alter the Serotonin transporter (5-HTT). We hypothesise that Aβ may interact directly with the 5-HTT. In this study, HEK293 cells were treated with antidepressants and cross-linked, using disuccinimidyl suberate (DSS) as a membrane-permeable reagent and bis[sulfosuccinimidyl] suberate (BS3) as a membrane-impermeable reagent, useful for cell-surface protein cross-linking. We then performed a sequential immunoprecipitation (IP) using the 22C11, C-Term, 6E10 and 4G8 antibodies, in that order, to progressively isolate the full length amyloid precursor proteins (APP) and related fragments and specify on which portion of the APP molecule the 5-HTT may be interacting with. Finally, the samples were run on a western blot and then imaged. This study shows that there is physical interaction between the Aβ and the 5-HTT. With this information further studies into the mechanism of this interaction can be justified.

Veronica Nguyen (Drs. Katelyn Halpape, Amy Soubolsky, Annabelle Wanson)

Public Drug Coverage of Aripiprazole and Brexpiprazole for Major Depressive Disorder: A Canadian Environmental Scan

Background: There are approximately 5.4% of Canadians currently living with major depressive disorder (MDD). The Canadian Network for Mood and Anxiety Treatments 2023 Clinical Guidelines recommend partial dopamine agonist antipsychotics (i.e., aripiprazole and brexpiprazole) as first-line adjunctive therapy for difficult-to-treat depression (DTD). These medications are not covered for MDD in Saskatchewan.

Objectives: In order to advocate for the inclusion of aripiprazole and brexpiprazole on the Saskatchewan Drug Formulary, our project aims to assess and compare the public drug coverage of these medications for the treatment of MDD across all Canadian publicly funded drug plans.

Methods: All 13 publicly accessible Canadian formularies were comprehensively reviewed, and representatives from federal, provincial, and territorial health ministries were consulted to verify the information obtained from the public websites and to request additional information when needed.

Results: The environmental scan revealed that aripiprazole and brexpiprazole are fully covered for MDD across most publicly funded drug plans except for the Yukon, British Columbia, and Saskatchewan, and Québec (brexpiprazole only).

Conclusion: Aripiprazole and brexpiprazole should be listed as unrestricted benefits to ensure that there is no healthcare inequity to accessing first-line adjunctive pharmacotherapy for Saskatchewan residents with MDD.

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