College of Pharmacy and Nutrition

2025 RESEARCH SYMPOSIUM

February 12-14, 2025, University of Saskatchewan

Greetings and welcome to the College's 2025 Research Symposium!

We are so pleased to celebrate our amazing graduate student researchers and their cutting-edge projects. The College is indebted to our organizing committee, judges, and sponsors for making this event possible. I sincerely hope you find our event engaging and inspiring.

Dr. David Blackburn
Professor and Associate Dean, Research and Graduate and Postdoctoral Affairs

WEDNESDAY, FEBRUARY 12

2nd floor B-wing Atrium

12:00	Registration, Light Lunch, and Poster Session
	Cameron MacLeod, Sedigheh Barzegar, Prasobh R. Thampy, and Radwa Mahmoud
12:45	Opening Remarks

GB03

1:10	Gabriela Loureiro
1:20	Karim Karbin
1:30	Marisa Desmarais (15 min, zoom)
1:50	Arash Amanlou (15 min)
2:10	Leilei Sun
2:20	Break: Snacks, Refreshments, and Prize Draws
2:40	Omid Farshad (15 min)
3:00	Amir Khajavinia (15 min)

Applied/Clinical Sciences – Pharmacy
Applied/Clinical Sciences – Nutrition
Pharmaceutical/Nutritional Sciences

THURSDAY, FEBRUARY 13

2nd floor B-wing Atrium

12:00	Registration, Pizza Lunch, and Poster Session

GB03

1:10	Abdul Salama
1:20	Iulia-Andreea Spataru
1:30	Isabella Zittlau
1:40	Jonathan Rekve
1:50	Oluwaseun Adekoya
2:00	Parinaz Amirimoghadam
2:10	Samantha Cunningham
2:20	Break: Snacks, Refreshments, and Prize Draws
2:40	Jennifer Chami (zoom)
2:50	Negin Faramarzi Garous
3:00	Iftekhar Rashid

FRIDAY, FEBRUARY 14

2nd floor B-wing Atrium

12:00	Registration, Light Lunch, and Poster Session	
	Chloe Langen	Alayna Jones

GB03

1:00	Melissa Neudorf
1:10	Sidra Uzair (zoom)
1:20	Alaa Mahmoud
1:30	Rasim Masimov
1:40	Mary Ejlali
1:50	Ramin Mohammadi
2:00	Tongshuo Hu
2:10	Connor Frank (15 min)
2:30	Break: Snacks, Refreshments, and Prize Draws
2:45	Awards Ceremony

Abstracts

Poster Presentations (2nd Floor B-wing Atrium)

Use of a Cannabigerol and Cannabidiol Formulation on Behaviour and Motor Coordination in the C57BL/6 Mouse

MacLeod, CD[1] and Laprairie*, RB.[1]

[1] College of Pharmacy and Nutrition, University of Saskatchewan.

Cannabis sativa has growing medicinal potential, but not every compound has been studied and understood at a mechanistic level. Cannabigerol (CBG) is a phytocannabinoid present in cannabis that has attracted pharmacological interest for its non-psychoactive and potential effects on motor control, behaviour, and pain perception. However, CBG's pharmacology is not as established as other cannabinoids (e.g., Δ^9-tetrahydrocannabinol [THC] or cannabidiol [CBD]). The purpose of these studies is to assess the effects of chronic (14 day) oral (p.o.) administration of CBG (30 mg/kg), CBD (30 mg/kg), a 1:1 ratio of CBG:CBD (30 mg/kg), or vehicle control (olive oil) on motor coordination in the rotarod, behaviour in the elevated plus maze (EPM), and pain perception in the tail flick latency (TFL) assay. The hypothesis of this study is that CBG will increase latency to fall, reduce anxiolytic traits in EPM, and decrease TFL nociception. Preliminary data collected to date reveal that rotarod time is increased following vehicle administration in male mice, and CBD or CBD:CBG in female mice, while no other changes have been observed with other phytocannabinoid treatments. EPM and TFL data also showed no effect on behavioural and nociception scores. Preliminary analyses of these data indicate CBD and/or CBD:CBG improve motor coordination and provide a temporary anti-nociceptive effect. Additional trials administering these phytocannabinoids on exercise parameters are required to understand better the impact on motivation, focus, and fatigue that these compounds might induce.

Investigation of morantel metabolism for use in rapid screening of veterinary drug residues

Barzegar, S.[1,2], Shurmer, B.O.[2], El-Aneed, A.[1], and Purves, R.W.*[1,2]

[1] College of Pharmacy and Nutrition, University of Saskatchewan.

[2] Centre for Veterinary Drug Residues, Canadian Food Inspection Agency, Saskatoon, SK, Canada

Introduction: The anthelmintic morantel is administered to livestock to remove and control gastro-intestinal endoparasites, however, it can also be used for the purpose of enhancing feed efficiency in animals. Thus, morantel is a regulated drug and its use needs to follow a specific dosing regimen. The Canadian Food Inspection Agency (CFIA) regularly tests animal-derived food products to ensure veterinary drug residues (VDRs) comply with the maximum residue limits (MRL) established for regulated drugs. The current gas chromatography mass spectrometry (GC-MS) confirmatory method for morantel is effective but the sample preparation procedure is time-consuming and uses a nonspecific VDR that cannot distinguish morantel from pyrantel. Our objective is to develop a workflow for the identification of metabolites, and to use it to find specific VDRs. **Methods:** Our novel workflow investigates *in vitro* metabolism using liver S9 fractions. Samples were analyzed using a Thermo ultra high-performance liquid chromatography system coupled with a Q-Exactive high resolution mass spectrometer (UPLC-HRMS). Thermo compound discoverer software was used to assist with metabolite identification. **Results**: Metabolites of morantel were generated *in vitro* using liver S9 fractions. Several phase I and phase II metabolites of morantel were identified and confirmed with a stable isotope labeled standard, $^{13}CD_3$-morantel. Five major metabolites were further investigated by tandem mass spectrometry to determine their metabolic reaction sites and therefore their structures. **Significance:** Our workflow identified five major metabolites, and their fragmentation patterns were confirmed using $^{13}CD_3$-morantel. These metabolites are specific to morantel and can serve as new residues. The proposed workflow is time efficient and can also be adapted for other veterinary drugs.

Systematic analyses of breast cancer data for target identification, drug combinations therapy and validation

Raveendran Thampy, P.[1] , Sakharkar, M[1] and Yang, J.[1]

[1] College of Pharmacy and Nutrition, University of Saskatchewan.

Breast cancer remains one of the leading causes of cancer-related mortality among women worldwide. Recent advances in drug discovery especially of various kinase inhibitors have emerged as a promising class of targeted therapies for breast cancer. These drugs block various kinase proteins involved in cancer cell growth and proliferation, offering more precise treatment options with fewer side effects than traditional chemotherapy. My ongoing research is exploring drug combination strategies by systematically identifying differentially expressed genes (DEGs) in breast cancer and use their combination as drug targets to study the targeted inhibition of dysregulated signaling pathways, that may prevent cancer progression. My research design is to employ the DESEQ2 program to identify DEGs from publicly available RNA-seq transcriptomics data. The next step is to filter out the upregulated DEGs that belong to the kinases family and based on the availability of FDA-approved inhibitors will carry out the cell viability assay and Kinase profiling. The final step will be to perform the animal study using the successful drug combinations. We identified ~1900 DEGs, which includes 1480 up-regulated and 220 down-regulated DEGs. Based on the literature, we selected 13 kinases from the up-regulated list that have known FDA-approved inhibitors available in the market. Cell viability assays were carried out and preliminary results were promising and found out the IC50 for two drugs Alsterpaullone and Entrectinib. The future direction is to carry out the kinome array analysis and do the animal study for these drugs and other combinations. This project explores the significance of DEGs in breast cancer research, their functional implications, and their potential for improving clinical outcomes.

Establishment of tandem mass spectrometric fingerprint of the most common phytocannabinoids in electrospray positive ion mode ionization

Radwa Mahmoud[1], Amir Khajavinia[1], Sedigheh Barzegar[1,2], Randy W Purves[1,2], Robert B. Laprairie[1], Anas El-Aneed[1]

[1] College of Pharmacy and Nutrition, University of Saskatchewan.

[2] Centre for Veterinary Drug Residues, Canadian Food Inspection Agency, Saskatoon, SK, S7N 2R3, Canada

The Cannabis sativa plant has been used for different applications, such as psychoactive pharmaceutical and food supplements. Cannabis contains over 120 cannabinoids. This part of my Ph.D. project evaluates the most common cannabinoids using Mass spectrometry (MS), a sensitive analytical technique used for qualitative and quantitative analysis. One experiment that is done with MS is tandem mass spectrometry (MS/MS) in which the compound od interest is fragmented into smaller ionized molecules, termed product ions. The product ions for each phytocannabinoid creates a unique MS/MS "fingerprint" that allows for its identification and subsequent quantification in biological matrices. Eight cannabinoids were assessed for their MS/MS dissociation. Since studied compounds are structurally similar, they undergo similar fragmentation pathway, enabling the identification of related structures. In essence, I developed, for the first time, a general MS/MS fragmentation pathway that can be applied to any cannabinoid. Currently, we are utilising the MS/MS data to screen cannabis plants extracts for cannabinoids as part of ongoing studies.

Feasibility of Pasteurized Donor Human Milk for HIV-Exposed Infants: A Pilot Study

Chloe Langen [1], Dr. Alexandra King [2], Dr. Rupeena Purewal [2], Dr. Kelsey Cochrane [1]

[1] College of Pharmacy and Nutrition, University of Saskatchewan.

[2] College of Medicine, University of Saskatchewan.

Pasteurized donor human milk (PDHM) offers significant immunological and nutritional benefits, yet its use for HIV-

exposed infants outside of neonatal intensive care units (NICUs) is limited. This pilot study aims to evaluate the feasibility of providing PDHM to caregivers of HIV-exposed infants in Saskatoon and addressing gaps in current infant feeding guidelines. This non-randomized, non-blinded pilot trial will recruit 10-20 caregivers of HIV-exposed infants through the Saskatchewan Health Authority Pediatric Infectious Disease Unit. Participants will receive PDHM for 6–8 weeks starting around two months postpartum, with four home visits for milk delivery, data collection, and caregiver support. Data will include caregiver logs on milk usage and infant tolerance, alongside growth metrics and health outcomes from pediatric records. We expect to identify key factors influencing the feasibility of PDHM provision, including caregiver acceptance, practical challenges in milk delivery, and infant health outcomes related to growth and tolerance. This study will provide critical insights into expanding safe feeding options for HIV-exposed infants. The findings could inform future clinical practices and policies and improve access to PDHM.

Analyzing the Effects of Cannabinol as an Individual Compound in Mice

Jones, A.M.[1] and Laprairie, R.B.* [1]
[1] College of Pharmacy and Nutrition, University of Saskatchewan.

Δ9-tetrahydrocannabinol (THC) is the compound in cannabis that produces the 'high' associated with cannabis use. When THC degrades from air, heat, or light, it produces cannabinol (CBN). The intoxication levels and psychoactive effects of CBN are still unknown. The primary objective of this project was to determine whether CBN is intoxicating and therefore should be regulated similar to THC and cannabidiol content that are currently regulated in Canadian cannabis products. There were two parts to this project. First was a battery of tests known as the "tetrad" to study the behavioral effects of 0.1-10 mg/kg CBN in C57BL/6 mice. Second was a pharmacokinetic time course to quantify the amount of CBN in mouse blood 10 min - 8 h following administration. The data collected shows that CBN produced effects in the behavioral tetrad, with some sex differences observed. Dose-dependent effects were observed with lower potency but similar efficacy to THC. Blood levels of CBN suggest a Tmax for CBN of approximately 6 h. The data collected to date indicate CBN is an intoxicating cannabinoid that should likely be regulated in cannabis products.

Abstracts

Wednesday, February 12

Oral Presentations (GB03)

International Perspective of Pharmacist's Role in Transplant

Gabriela Loureiro[1], Nicola Rosaasen[1], Alison Rowley[2], Haifa Lyster[3], Jeff Taylor[1], Holly Mansell[1]
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[2] King's College Hospital, London, United Kingdom
[3] Department of Cardiothoracic Transplantation & Mechanical Circulatory Support, Royal Brompton & Harefield Hospitals, Part of Guy's and St Thomas' NHS Foundation Trust and King's College London, London, United Kingdom

Background: Pharmacotherapy for solid organ transplant (SOT) recipients is complex. Pharmacists are officially recognized as part of the transplant team in the United States, but in other countries the role is less defined. Our objectives were to identify which countries have transplant pharmacists and to describe their role in SOT care. **Methods:** An internet search identified contact information for SOT centers in countries other than the USA. (Key terms = *country name* + *transplant* + *center* OR *institution* OR *program*). Institutions were emailed a survey in the country's language (39 translations) to determine if they had a transplant pharmacist (Survey 1). Snowball distribution was undertaken through SOT networks. If 'yes', institutions were asked to share another electronic survey with the pharmacist(s) (Survey 2). If 'no', they were asked why. Survey 2 for pharmacists had 4 sections: demographics; assessment of roles; barriers to providing care; interest in joining a network. Descriptive statistics were used for analysis. **Results:** Of 193 countries, 127 (65.8%) performed SOT. Survey 1 (sent to 1726 institutions) received responses from 131 institutions/40 countries.

Survey 2 received responses from 157 pharmacists/17 countries. Of 40 countries responding in total, 43% had transplant pharmacists, 19% supplied mixed responses, and 38% did not; the most common reason was that pharmacists did not routinely provide clinical care. Most pharmacist respondents (n=157) were licensed for 6 to 10 years (26.3%), didn't have specialized transplant training (88.4%) and provided inpatient care (86.6%). Nearly all were confident in their ability to provide SOT care (94%) and perceived a demand for SOT pharmacists (94%). Having a variety of duties leaving insufficient time was the most common barrier (59%). Almost half of participants (47%) demonstrated interest in joining a network. **Conclusion:** Transplant pharmacists are present in many countries, with important successes as well as challenges identified.

Applications of Quantum Technology in Food and Nutrition Research: A Scoping Review of Innovations, Challenges, and Future Directions

Karim Karbin[1], Vyom Patel[2], Dr. Mojtaba Shafiee[1], Dr. Adam Baxter Jones[3], Dr. Marta Erlandson[3], Dr. Ginny Lane[4], Dr. Phil Chilibeck[3], Dr. Steven Rayan[5]*, and Dr. Hassan Vatanparast[1,6]*

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[3] College of Kinesiology, University of Saskatchewan, Saskatoon, Canada;

[4] College of Agricultural and Life Sciences, Margaret Ritchie School of Family and Consumer Sciences, University of Idaho, Moscow, USA;

[5] Centre for Quantum Topology and Its Applications (quanTA) and Department of Mathematics and Statistics, University of Saskatchewan, Saskatoon, Canada;

[6] School of Public Health, University of Saskatchewan, Saskatoon, Canada

There is a burgeoning interest in emerging quantum technologies and the desire to develop use cases for them. It is natural to query whether such uses exist within food and nutrition sciences. This review provides a comprehensive overview of the current literature on quantum sensing and quantum computing in this field. A systematic search was conducted across Medline, Embase, Global Health, Web of Science, IEEE Xplore, and Google Scholar up to August 20, 2024. Non-English, non-peer-reviewed articles, and studies focused solely on traditional computing without quantum applications were excluded. A total of 59 articles were included, highlighting emerging quantum technologies for nutrient detection and dietary optimization. Quantum sensing, particularly with quantum dots, shows high sensitivity for assessing food quality and composition parameters, including vitamins and antioxidants. In addition, quantum-inspired algorithms, such as the Hybrid Quantum Genetic Algorithm, are being developed for personalized nutrition and diet optimization. However, many applications are still in the early stages, with limited empirical validation and challenges, such as material toxicity and integration with traditional methods. Although promising, the practical benefits of quantum technology over classical methods are currently marginal, necessitating further research and technological advancements.

Working Together to Promote Health and Prevent Type 2 Diabetes, a Community Led Initiative with Cowessess First Nation

Marisa L Desmarais[1,4] , Hassan Vatanparast*[1,2], Ginny Lane[3], Michele Monroy-Valle[2], Kerry Mansell[1], Zoe Longworth[1], Mojtaba Shafiee[1], Kelly Finkas[4], Lyndon Lerat[4], Erica Beaudin[4]

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According to the Public Health Agency of Canada, the prevalence of type 2 diabetes (T2D) among Indigenous people in Canada is 1.9 times higher than the non-Indigenous and is rising. These rates can be attributed to inequities in the determinants of health and as a result of colonization. We aimed to use community based participatory action research to engage Indigenous people living on reserve in the development of diabetes management programming. The study

utilized an exploratory mixed methods approach. Quantitative data was gathered via a survey to assess sociodemographic factors, self-reported health status, traditional food consumption and knowledge. Qualitative data was gathered at a town hall event, participants reflected on survey results and shared their ideas for best practices to promote healthy eating and reduce the burden of T2D. Fifty-one percent (n=57) of respondents indicated that they rarely or never eat traditional Indigenous foods. Factors preventing them from eating traditional foods included no time to hunt, fish, forage or prepare (n=32), and no access/availability (n=33). Data from the town hall preliminary thematic analyses highlighted that having access to hunting materials, meat preparation, and culturally customized education on T2D were the most frequent ideas to promote health and reduce the burden of T2D. The discussion focused on health benefits of Indigenous traditional foods, limited access to traditional foods and the struggle with the cost of feeding families. Preliminary data integration showcases that the community is aware of the benefits of eating traditional foods and are actively working towards solutions to increase access within the community. In conclusion, the community has identified initiatives that increase access/accessibility of traditional foods and indicated openness to working together on future projects.

3D Modeling and Additive Manufacturing of Nasal Cavities for In Vitro Assessment of Nasal Spray and Aerosol Drug Delivery

Amanlou, A.[1], Oxman, J.[2], Kuang, D.[3], Adams, S.,[4*], Haddadi, A,.[1*]

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[4] Department of Medical Imaging, College of Medicine, University of Saskatchewan

Introduction: Understanding drug deposition patterns in the nasal cavities is essential for optimizing nasal drug delivery. However, accurately modeling the complex nasal anatomy from CT scans encounters challenges due to motion artifacts, resolution limitations, and difficulties in translating imaging data into 3D models. This study establishes a methodological framework to address these challenges through medical image enhancement, segmentation, and 3D printing to enhance anatomical precision, improve material clarity, and minimize human error, enhancing the assessment of nasal spray and aerosol formulations. **Methods:** Medical image enhancement was achieved using mathematical interpolation algorithms, while a combination of conventional methods and artificial intelligence (AI) segmentation techniques was applied for nasal cavity modeling. Three-dimensional models were developed into anatomically precise replicas through stereolithography (SLA) and fused deposition modeling (FDM) 3D printing, with post-print processing to further improve model quality. Various techniques were employed to assess nasal spray deposition patterns in the printed models. **Results:** Image processing algorithms significantly improved the accuracy of 3D models, while the segmentation process was made more time-efficient, reducing human error and enhancing model precision. The transparency of the model was influenced by the materials used in FDM and SLA 3D printing. To minimize human error further, a device was designed to actuate inhalers and nasal sprays. **Significance:** The established methodology provides researchers with a systematic approach to overcoming challenges in 3D modeling and printing nasal cavity models. The study's findings could help advance the development of nasal spray formulations, enhancing drug delivery efficacy for nasal administration.

Integrated transcriptomic and metabolomic analyses of human and mouse adipocytes

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[1] College of Pharmacy and Nutrition, University of Saskatchewan, Canada

Overweight and obesity are increasing public critical health issues worldwide nowadays. Mouse preadipocyte and human preadipocyte are in vitro adipocyte models that play a crucial role in helping us understand the molecular mechanism of adipogenesis. PPARγ are ligand-activated transcription factors, that mediate preadipocyte differentiation, that regulate target gene expression by binding to specific peroxisome proliferation response elements (PPRE) within promoters of regulated genes. S1P is the sphingolipid metabolite that belongs to the signaling pathway of sphingolipids and acts as an agonist of PPARγ. We used mouse preadipocyte 3T3-L1 and human preadipocyte SGBS as in vitro models

to evaluate the effect of S1P on transcriptional activities and metabolomic activities (central carbon metabolism and fatty acid metabolism). The transcriptome and metabolomic analyses showed that S1P affects gene expression and metabolite expression in adipocytes. After mapping metabolites to their responding genes, we found some common genes between transcriptome and metabolism that are related to adipocyte differentiation. After pathway enrichment, we found that S1P impacts several metabolic pathways to affect adipocyte differentiation. This result helps us understand more about obesity and provides insights into the research and therapy of obesity.

Development and characterization of niosome encapsulated docetaxel for the treatment of breast cancer: in-vitro and in-vivo evaluations

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Introduction: Docetaxel (DTX) is an antineoplastic agent for cancer treatment, but its therapeutic efficiency is limited due to low solubility and severe side effects. The objective of the present research was to develop DTX-loaded niosomes to improve the therapeutic index and reduce the toxicity of DTX. **Methods:** DTX-loaded niosomes were prepared through the thin-film hydration technique and characterized in terms of particle size, zeta potential, morphology, drug loading, and release. Furthermore, the efficacy and toxicity of selected niosomes were evaluated in in-vitro and invivo models. **Results:** The optimized DTX-loaded niosomes had an average vesicle diameter of about 100 nm and were spherical shaped with high encapsulation efficiencies of 74.0%, negative zeta potential, and sustained release pattern. In-vitro biological tests revealed that DTX-loaded niosomes had significantly higher anticancer activity than free DTX. Systemic toxicity found the DTX-loaded niosome caused no severe toxicity in different tissues and had better antitumor efficacy in mice bearing breast cancer models. **Significance:** Our results demonstrated that the niosomal formulation of DTX could potentially provide a suitable parenteral formulation with more stability, higher cytotoxicity, lower adverse effects, and improved antitumor activity.

Development of quantification and imaging mass spectrometric methods for the analysis of psilocin in plasma and brain tissues

Khajavinia A.[1], Michel D.[1], Ezeaka U.C.[1], Purves R.W.[1,2], Chen C.[3], Ollen-Bittle N.[3], Whitehead S.N.[3], Laprairie R.B.[1], and El-Aneed A.[1,*]

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[2] Canadian Food Inspection Agency, Saskatchewan, Canada

[3] Department of Anatomy and Cell Biology, Western University, Canada

Psilocybin is a psychedelic compound found in hallucinogenic “magic mushrooms”. Its active metabolite is psilocin, which has been the subject of several studies for the treatment of psychological disorders, such as anxiety, depression, and post-traumatic stress disorder. As such, the pharmacokinetic properties of psilocin should be evaluated to ensure its safety and efficacy as part of the drug development process. Liquid chromatography-Tandem Mass Spectrometry (LC-MS/MS) analysis, based on the published reports, showed a major interference in mouse plasma that was not, to the best of our knowledge, reported previously. We, therefore, aimed to identify and separate the interference. Various chromatographic columns, mobile phase conditions, and high-resolution mass spectrometers (HR-MS) were tested and utilized. Exact mass measurement and MS/MS analysis determined the structure of the interfering compound, which was confirmed to be tryptophan. After the identification of the interfering compound, a fast and reliable hydrophilic interaction liquid chromatography (HILIC)-MS/MS method was developed and validated as per the FDA and EMA guidelines. Subsequently, psilocin concentration in 114 plasma samples was successfully determined. Lastly, to determine the tissue localization of psilocin in mouse brain, a new mass spectrometry imaging (MSI) method will be developed using matrix-assisted laser desorption ionization (MALDI-MSI). Preliminary tests confirmed that psilocin was detectable in brain tissue using a MALDI- Time of Flight (TOF/TOF) device. Understanding the behaviour of psilocin in the body as well as its tissue distribution in the brain will contribute to finding improved therapeutic options for the

treatment of psychological disorders.

Abstracts

Thursday, February 13

Oral Presentations (GB03)

Relative Bioavailability of Two Orally Administered CBD Formulations in Healthy Male Adults

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[1] College of Pharmacy and Nutrition, University of Saskatchewan

[2] Faculty of Kinesiology and Health Studies, University of Regina.

Cannabidiol (CBD), a phytocannabinoid with potential anti-concussive therapeutic use in contact sports, suffers from low bioavailability (~6%) when administered orally. This low bioavailability necessitates large doses to achieve desired therapeutic effects. This study aims to investigate whether buccal administration of CBD results in greater systemic bioavailability compared to oral administration. This phase 1 clinical trial employs a randomized, open-label, two-sequence crossover design. Healthy male adult participants will receive a single dose of CBD either by buccal or oral administration, followed by extensive blood sampling. Blood samples are analyzed for CBD and its metabolite concentrations using a validated LC-MS/MS analytical method. Pharmacokinetic parameters are then estimated using GraphPad Prism software. An increase in bioavailability would allow for lower drug doses to achieve the same therapeutic response, potentially reducing side effects, improving tolerability, and decreasing treatment costs. This study's findings will not only guide product selection for subsequent phase II and phase III studies that are underway to assess CBD as a treatment intervention in concussion, but also highlight the need for more effective CBD formulations for therapeutic use in sports-related concussions and other applications.

Structure-activity characterization of a new generation of nanodiamond carriers designed to treat hepatocellular carcinoma

Spataru, I.[1], Alwani, S.[2], Michel, D.[1], Kawamura, E.[3], Wang, J.[4], Badea, I*[1] *

1. College of Pharmacy and Nutrition, University of Saskatchewan
2. Memorial University of Newfoundland
3. University of Saskatchewan Western College of Veterinary Medicine
4. Canadian Light Source Inc

Introduction: Nanodiamonds (NDs) are carbon particles of 20-40 nm, easily and inexpensively obtained by detonating carbon-containing explosives. Their small size, large surface area, and chemical stability has led to their consideration as gene delivery agents. Their advantage compared to lipid- and polymer-based gene therapy agents is their lack of toxicity and immunogenicity. Genes causing cancer can be blocked by small interfering RNA (siRNA). NDs functionalized with amino acids (fNDs), such as lysine and histidine, are of interest due their ability to bind and protect siRNA, creating diamoplexes, and deliver it inside cancer cells. **Methods:** fNDs: lysine/lysyl-histidine-NDs (H50K50 NDs), featuring 3 or 6 carbon linkers respectively, were synthesized and characterized. Scanning Transmission X-ray Microscopy (STXM) and Transmission Electron Microscopy (TEM) studies were performed to map localization of NDs in a human hepatocellular carcinoma (HCC) cell model (HepG2). Metabolic activity-based cell viability assays (MTT) were conducted to determine synergistic combinations between the anti-MCL1 siRNA diamoplexes (designed to promote apoptosis in HepG2 cells) and sorafenib in the same cell model using Combenefit. **Results:** We identified specific signals characteristic of the sp3 diamond core for NDs (C1s region), differentiating them from other carbon-based materials. Furthermore, the combination study with sorafenib indicated that there is statistically significant ($\alpha<0.05$) synergy between the lowest

tested dose of sorafenib (0.525 µM) and all tested doses of diamoplexes (4.5 to 72 pmol). Significance: The development of new siRNA-based therapies can help with offering alternative medication avenues when it comes to treatment-resistant HCC.

Microbubble assisted drug delivery for glioblastoma

Isabella Camargo Zittlau [1], Steven* Machtaler [2], Ildiko* Badea [1]

[1] Drug Discovery and Development Research Group, College of Pharmacy and Nutrition, University of Saskatchewan

[2] Department of Medicine Imaging, College of Medicine, University of Saskatchewan

Glioblastoma is the most common and aggressive brain tumor in adults. One significant challenge for therapy is the blood-brain barrier (BBB), which maintains the brain's integrity. Microbubbles (MBs) are colloidal particles ranging from 1 to 10µm in diameter and have been utilized as contrast agents in imaging. When combined with high-intensity focused ultrasound, MBs open temporarily the BBB, which enhances targeted drug delivery. The objective is synthesizing MB with Gemini lipids (GL), incorporating temozolomide, and characterizing the drug-loaded microbubbles. Different molar ratio formulations will be prepared, with and without GL, followed by the evaluation of size, concentration of MBs, and surface properties. The results obtained after adding Gemini lipid to the formulation showed that the presence of this new component in the formulation favored the formation of a higher concentration of microbubbles, as well as a reduction in size and an increase in zeta potential. Not only does MB allow for a less invasive treatment than the current ones, but it also allows the drug to be delivered specifically to the area selected by the cancer. Since it allows the substance to pass through the BBB more easily, a lower concentration of drug is necessary to be injected. In consequence, it is possible to reduce the adverse effects caused by chemotherapy as well as circumvent drug resistance caused by high doses of drugs.

Leveraging Synchrotron Technology to Enhance Drug Delivery Systems

Rekve, J.[1] Wilson*, L.[2] Badea*, I.[1]

[1] College of Pharmacy and Nutrition, University of Saskatchewan

[2] Department of Chemistry, College of Arts and Sciences University of Saskatchewan

Lipid nanoparticles (LNPs) are an advanced platform for nucleic acid delivery, offering protection and efficient cellular uptake. The incorporation of excipients such as glucose and sucrose can influence LNP structural integrity, stability, and drug release. This study explores the impact of lipid composition and excipients on LNP formulation and performance. LNPs were formulated with DNA, saRNA, or mRNA using Gemini lipids, incorporating either 5% glucose or 9.25% sucrose. Small-angle X-ray scattering (SAXS) was employed to analyze structural organization, lipid packing, and nanoparticle stability. The effects of varying lipid molar ratios were assessed to determine their influence on encapsulation efficiency and drug release kinetics. SAXS analysis revealed that glucose-based formulations exhibited higher structural ordering and enhanced stability compared to sucrose-based LNPs. Increased peak intensities and hexagonal nanostructure formation in glucose formulations suggest improved drug loading and sustained-release potential. By optimizing LNP structural organization and stability, this study contributes to the development of more effective nucleic acid delivery systems. The findings have implications for improving therapeutic efficacy, patient compliance, and advancing targeted treatments for neurodegenerative diseases.

Efficacy testing of a topical formulation of nifedipine in Rat tail model of raynaud's phenomenon

Oluwaseun Adekoya [1], Dr. Ellen Wasan*[1] , Dr. Dyan Olver*[2]

[1] College of Pharmacy and Nutrition, University of Saskatchewan

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Introduction: Raynaud's phenomenon (RP) is a vasospastic disorder characterized by an episodic, reversible vasoconstriction of the extremities in response to cold exposure. The prevalence of primary RP in the general population is reported to be 3-5% with a higher incidence in colder climates. Nifedipine, a vasodilatory agent, is considered a first-

line treatment for the management of RP. Oral nifedipine is associated with adverse effects that could warrant discontinuation of treatment; hence, topical therapy appears to be the way forward. However, the efficacy of topical nifedipine is inconsistent due to its rapid photodegradation upon exposure to UVA radiation. Wasan et al., in a previous study, developed a topical nifedipine formulation that was stable in up to 8 hours of UVA exposure via the incorporation of avobenzone and quercetin. **Methods:** The aim of this study is to evaluate the potential vasodilatory effect of the photostabilized topical nifedipine on a rat tail model of cold-induced vasoconstriction. The rat tail will be subjected to a cold challenge to provoke vasoconstriction characteristic of RP. Changes in blood flow with treatment will be measured with a Doppler ultrasound instrument and compared with placebo cream. Pharmacokinetic studies will be carried out to determine the extent of systemic absorption of nifedipine from the topical formulation. **Expected outcomes:** We anticipate that the topical nifedipine will significantly increase blood flow velocity when applied to a rat tail with cold-induced vasoconstriction. It is expected that application of topical nifedipine will reduce the extent of vasoconstriction when applied prior to cold exposure in a rat tail. Finally, minimal systemic exposure is expected from the topical application of nifedipine, which would be a desirable outcome. **Significance:** The positive outcome of this study will contribute to advancing effective topical, as-needed treatment strategies for the management of RP in clinical practice.

Study of common health complaints experienced by Saskatchewan senior citizens

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Introduction: With the aging population rising, self-care for minor ailments is essential to reduce healthcare strain. While often self-limiting, these ailments can significantly impact well-being and drive unnecessary healthcare visits. Understanding self-care behaviors in older adults can help address unmet needs and improve health outcomes. **Methods:** A literature review identified common minor ailments and management strategies. A structured questionnaire was developed, refined through expert review and pilot testing, and administered to seniors in Saskatchewan (October–November 2024). Data were analyzed using SPSS v.29 and Excel 2021. **Results:** Among 356 participants, common symptoms included back pain, joint pain, insomnia, fatigue, and allergies. OTC medications were the most used intervention, while watchful waiting was frequent for tinnitus, loneliness, and erectile dysfunction. Healthcare consultations were rare but more common for nail fungus and vaginal dryness. Satisfaction was highest for cold sores and headaches but lowest for tinnitus and erectile dysfunction. **Implications:** Elderly individuals often rely on self-care and OTC medications, yet some conditions remain poorly managed. Enhancing education, healthcare access, and integrated care approaches could improve symptom management and overall well-being.

Using Patient Feedback in Community Pharmacy: A Pilot Study

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Introduction: This study aims to evaluate whether a patient-reported experience measure survey can be administered feasibly in a community pharmacy environment, and whether the results are acceptable and capable of influencing practice improvement from the perspective of pharmacy professionals and staff. **Methods:** In phase one of this mixed methods study, eight pharmacies invited their patients to complete a patient experience survey developed by the Saskatchewan College of Pharmacy Professionals, they were then provided a report that compiled feedback from their patients. In the second phase, semi-structured focus groups were held with pharmacy staff from seven participating pharmacies that discussed the feasibility of advertising the survey, the acceptability of the feedback, and the perceived usefulness of the feedback in supporting quality improvement initiatives. Descriptive statistics were aggregated from the feedback results, and thematic analysis was used to analyze focus group transcripts. **Results:** A total of 133 patients responded to the survey across the eight participating pharmacies. All pharmacies scored highest on questions in the domain of Communication and Collaboration, and lowest in the domain of Providing Care. Preliminary results from focus groups suggest that the survey process is feasible for the community pharmacy environment, and the feedback results acceptable. Perspectives on impact and support needs were more varied. **Significance:** The results of this study may be used to guide programs, such as that from the SCPP, which support pharmacy professionals in gathering and using

patient feedback to further patient-centered care.

Lived Experiences of People with Inflammatory Bowel Disease in Saskatchewan regarding Complementary Health Approaches Involving Dietary Practices and Access to Nutrition Care

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Introduction: Complementary and alternative health approaches such as medical cannabis and nutritional interventions are increasingly being used as part of inflammatory bowel disease management. As clinical trials unfold proving their effectiveness, outcomes such as symptom relief, psychological well-being, and quality of life considerations are increasingly being examined. People with IBD appear to have lower scores on QOL indices, such as food-related quality of life which are key patient-reported outcomes that impact health-related quality of life and treatment decisions. Although, a multidisciplinary approach to IBD healthcare delivery has been deemed essential, many people do not have access to nutrition care or a primary healthcare provider to support complementary health approaches. This study aims to explore the lived experiences and perspectives of people with IBD in Saskatchewan regarding complementary health approaches that involve dietary practices and access to nutrition care to improve understanding of their perceived effect on disease-related symptoms and health-related quality of life. **Methods:** A qualitative description approach with principles of patient-oriented research will be used to interview people ≥18 years of age with IBD from Saskatchewan using a semistructured interview guide. The transcribed interview data will be analyzed using thematic analysis and descriptive statistics to summarize demographic or disease characteristics. **Results:** Pending. **Relevance:** Findings may help develop improvement strategies that include patient resources, clinical practice guidelines or models of nutrition care. People with IBD may feel supported and empowered to make informed treatment decisions for symptom improvements, overall QOL, and psychosocial well-being in a more seamless integrative healthcare system.

The Impact of Nutrients on Circadian Clock in Head and Neck Cancers

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Introduction: Precision medicine, integrating dietary factors, circadian rhythms, and genetics, offers promise for understanding cancer progression. Disrupted circadian rhythms, governed by clock genes, can influence cancer and be affected by nutrients and dietary patterns. **Study Overview:** This study consists of two sub-studies: (1) the effect of a Western diet (WD) on RNA expression and DNA methylation of clock genes in mice oral tongue epithelial cells compared to a normal diet (ND), and (2) the impact of folic acid (FA) on clock genes (e.g., Bmal1, Per1, Per2) expression and DNA methylation in Head and Neck Squamous Cell Carcinoma (HNSCC). **Methods:** Study1 examined the effects of WD vs ND on clock genes expression and DNA methylation in mice under controlled light-dark and constant darkness conditions for 14 weeks. Study 2 explored the impact of 80μM FA treatment for 7 days on RNA expression, DNA methylation, and protein levels of clock genes in synchronized FaDu cells (HNSCC). Both studies assessed RNA expression, targeted DNA methylation of clock genes, and whole-genome DNA methylation, while protein levels were analyzed exclusively in Study 2. **Results:** Study 1: The expression of the clock gene Bmal1 varied between the WD and ND groups, with the ND group exhibiting significantly lower whole-genome DNA methylation levels. Study2: FA treatment reduced FaDu cell viability in a dose-dependent manner, upregulated RNA expression of Bmal1, Per1, and Per2, with only Bmal1 protein upregulation confirmed, and significantly reduced whole-genome DNA methylation. **Conclusion:** This study highlights the impact of diet and folic acid (FA) on circadian clock gene regulation and epigenetic modifications, presenting promising therapeutic strategies for HNSCC.

Implementation Research on Evaluating the Effectiveness of Integrated Maternal and Child Nutrition Services through the Public Health System in Rural Ethiopia

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Introduction: Ethiopia has one of the highest malnutrition burdens in the world, with a child stunting rate of 39%. The overall nutrition situation has worsened over the past few years due to COVID-19, recurrent conflicts, drought, and the rising cost of food. The government of Ethiopia and development partners are investing in health and other sectors to improve the situation. This research aims to evaluate the effectiveness of integrated maternal and child nutrition interventions implemented through the public health system in rural Ethiopia. **Methods:** A contextual implementation research methodology will be used, incorporating both quantitative and qualitative approaches. The study will be conducted in select woredas (districts) of the Sidama region, with interventions divided into basic and intensive packages. The interventions include social and behavior change approaches and improving the quality of nutrition services at the primary health care level. Data collection will include surveys, interviews, focus group discussions, and health facility assessments. **Results:** Preliminary results are expected to show improvements in maternal and child nutritional practices in areas receiving the integrated intervention packages. Differences between the basic and intensive intervention groups will also be analyzed. The study will provide insights into the effectiveness of various intervention strategies. **Significance:** Findings will inform nutrition policies and programming in Ethiopia and other low- and middle-income countries, contributing to improved nutrition services and practices. The research will also offer valuable lessons for implementing similar interventions in other regions facing malnutrition challenges.

Abstracts

Friday, February 14

Oral Presentations (GB03)

The Assessment and Utility of the PharmaZzz Training Program and Provision of Cognitive Behavioral Therapy/Non-medication Therapy (CBTi/NMTi) For Insomnia

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Introduction: CBTi/NMTi for insomnia is recommended as first-line therapy over pharmacotherapy, however, one of challenges to the accessibility of this treatment is limited providers. PharmaZzz is a program that trains healthcare professionals to provide CBTi/NMTi. This study describes the impact of the PharmaZzz program and the current practices of PharmaZzz-trained healthcare professionals. **Methods:** An electronic, cross-sectional questionnaire was emailed to healthcare professionals that completed the PharmaZzz program. Data collection was open from November 25th, 2024 to January 20th, 2025. The questionnaire explored their experience with the program, how they have implemented CBTi/NMTi services into their practice, and their perceived patients' response to this service. Data was collected in REDCap and analyzed using descriptive statistics and content analysis for open-text responses. **Results:** Nineteen healthcare professionals responded to the questionnaire (response rate 9.6%). One person was excluded from the analysis as they had not completed the PharmaZzz training program. Most healthcare professionals found the program useful (94.4%) and applicable to their practice (72.2%). PharmaZzz-trained healthcare professionals that provide CBTi/NMTi in practice is high (61.1%), and of these, all perceive their provision of CBTi/NMTi as beneficial and that it improves patients' sleep patterns (excluding one individual who did not record this information). **Significance:** The findings of this study provide insights into the effectiveness of the PharmaZzz program and its implementation into practice. These insights can be utilized to help guide further assessment of the program.

The Effects of Milk and Yogurt Supplementation on Bone Health, Body Composition, and Gut Microbiota in Canadian Young Adults: A Randomized Controlled Trial

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Introduction: Saskatchewan has the highest crude fracture rate among those aged ≥ 50 years. The consumption of dairy products and calcium intake from diet and supplements have decreased among Canadian. Data on bone health of young Canadian adults is limited. The overarching goal of this project is to determine the role of milk and yogurt supplementation on bone health, body composition and gut microbiota in Canadian adults aged 19 to 30 years. **Methods:** The data for this randomized controlled trial will be collected over 24 months, at 5 time-points, from 99 eligible participants divided among three study arms: 1) habitual diet (HD) (n=33), 2) HD + 2 servings of yogurt (n=33), and 3) HD + 1.5 servings of milk (n=33) (both providing approx. 500 mg Ca/day). The primary outcome measures are changes in femoral neck BMD while the secondary outcome measures are, BMD (total hip, lumbar spine, and whole body), BMC (total hip, femoral neck, lumbar spine, and whole body), bone structure and geometry, biochemical indices of bone turnover, hormonal indices related to bone metabolism, anthropometrics, body composition, and gut microbiota. **Results:** A total of 55 eligible participants were randomized among three study arms until January 2025. Preliminary results indicate that vitamin D status is low in a subset of this sample. We found a few cases of primary osteoporosis due to low calcium and vitamin D intake. The complete baseline data will be analyzed by May 2025 after completion of measurement in total sample. **Significance:** The findings of this research will fill the existing scientific knowledge gaps and provide valuable information for developing targeted health initiatives to educate the public on the consumption of fermented and non-fermented dairy products and their role on health.

Liquid Chromatography-Mass Spectrometry Strategy for The Assessment of a Novel Cyclodextrin-modified Drug Delivery System

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Neutrophilic asthma is considered severe refractory asthma, which does not respond well to conventional treatments. An anti-inflammatory patented peptide reduces neutrophilic inflammation and is a strong candidate to treat neutrophilic asthma. However, injectable administration of the peptide is not practical, thus an alternative, non-invasive intranasal drug delivery system based on cationic gemini surfactant-conjugated β-cyclodextrin (CD-Gem) is being developed and tested. Gemini surfactants are versatile lipid-based drug delivery agents because of their ability to encapsulate and protect therapeutic biotechnology products, such as DNA and RNA. The CD-Gem has a unique cyclodextrin cavity, allowing it to encapsulate therapeutic peptides. A lung epithelial cell model will be used to test the delivery efficacy of the novel formulation and to assess trans-membrane delivery of the peptide/CD-Gem complex. To achieve this, a novel liquid chromatography-tandem mass spectrometry (LC-MS/MS) method are being developed. Preliminary MS analysis of CD-Gem showed a precursor ion as doubly charged species [M]2+. MS/MS analysis showed the fragmentation behaviour of the compound, allowing for the identification of multiple ions to be used in quantification. LC-MS/MS using a reversed phase column showed promising results that require additional optimization to attain optimal peak shape. The end goal is the development of a safe and effective intranasal formulation for the treatment of severe neutrophilic asthma.

Development of Polymeric Nanoparticle Adjuvants for Mucosal Influenza Vaccines

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Introduction: Mucosal surfaces are the first sites that infectious agents contact, and these sites are defended by a local immune system. Therefore, enhancing local mucosal immunity is crucial for protection against pathogens. Conventional vaccines often fail to generate sufficient mucosal immune responses, which highlights the need for the development of mucosal vaccines. It's also important to note that mucosal vaccination not only stimulates mucosal immunity but also promotes systemic immune protection. Therefore, mucosal sites are promising targets for vaccine development. **Methods:** The development of a vaccine formulation consists of four main stages before entering clinical trials. Preparation, Physicochemical characterization, *In vivo* and *In vitro* evaluation. In this project, a microfluidic mixing method was used for the preparation of vaccine formulation. For the physicochemical characterization of the formulations, Dynamic Light Scattering, Transmission Electron Microscopy, Small Angle X-ray Scattering, and Gel electrophoresis techniques were used. At the *in vitro* evaluation stage, MTT, Flow cytometry, and Confocal microscopy, techniques were used to evaluate the effect of the formulations on cell viability, immune response generation, and cellular internalization, respectively. **Results:** A sensitive microfluidic mixing method has been optimized to allow the preparation of vaccine formulations with varying physicochemical properties. After completing the physicochemical characterization, suitable pharmaceutical candidates were evaluated in vivo. The results of the in vivo experiments indicate that the developed formulations exhibit a low cytotoxic effect on cell viability, they can be internalized by immune cells and elicit immune responses. The project is now advancing to the in vivo evaluation stage. **Significance:** This study focuses on using the flu as a model disease to evaluate the effectiveness of a polymer-based nanoparticle vaccine adjuvant for vaccination. The findings will enhance our understanding of how polymer-based adjuvant carriers can contribute to the development of new mucosal vaccine formulations for various diseases, particularly the flu.

Lipid Nanoparticles for Nasal Vaccine Delivery: Mechanisms and Immunological Impact

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Introduction: Nasal vaccines provide a unique advantage by inducing both mucosal (IgA-mediated) and systemic (IgG-mediated) immunity. Lipid nanoparticles (LNPs) enhance vaccine efficacy through improved antigen delivery and uptake by antigen-presenting cells (APCs), including dendritic cells and macrophages, within the nasal-associated lymphoid tissue (NALT). **Methods**: This study investigates how LNP lipid composition affects intracellular processing in relation to MHC I and MHC II surface expression and cytokine production. LNP formulations incorporating ionizable or cationic lipids, cholesterol, and stabilizers will be assessed for antigen delivery efficiency, cellular uptake, and immune activation in vitro. **Results**: Preliminary findings suggest that cationic LNPs improve mucoadhesion, facilitating enhanced antigen uptake and lymph node activation. Different lipid compositions influence endosomal escape and cytokine secretion, potentially modulating Th1 and Th2 immune responses. **Significance**: Optimizing LNP formulations for nasal vaccines can improve immunogenicity, enhance vaccine stability, and reduce the required dosage. This study contributes to the development of next-generation mucosal vaccines, which can be used to prevent respiratory infections such as PRRSV and H1N1.

Development of a PLGA-Based Nanoparticulate Vaccine Against Porcine Epidemic Diarrhea Virus (PEDV)

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Introduction: Porcine epidemic diarrhea virus (PEDV) is a highly contagious coronavirus causing severe diarrhea and high mortality in neonatal pigs, leading to major economic losses in the swine industry. Traditional vaccines have shown limited efficacy and unwanted spermicidal effects, necessitating a safer and more effective alternative. **Methods:** This study explores a PLGA-based nanoparticulate vaccine incorporating PEDV antigens and adjuvants such as Montanide, Squalene, QuilA, and MPLA. PLGA nanoparticles are synthesized via an emulsion-solvent evaporation method and characterized for size, morphology, antigen encapsulation efficiency, and release kinetics. Immune activation is evaluated through in vitro cellular uptake studies and in vivo trials assessing immunogenicity in pigs. **Results:** Preliminary data confirm the successful formulation of PLGA nanoparticles with controlled antigen release, optimal size (~200 nm), and high encapsulation efficiency (>80%). Ongoing studies focus on evaluating immune responses, including cytokine production and antibody titers. **Significance:** Unlike traditional vaccines, which exhibited spermicidal properties, our PLGA-based nanoparticulate vaccine has shown no spermicidal activity while maintaining strong immunogenicity. This novel approach enhances antigen stability, immune activation, and mucosal immunity, providing a safer and more effective solution for PEDV control in swine populations, reducing economic losses, and minimizing antibiotic use in pig farming.

Combining RIT with ICIs to enhance the CRC treatment efficacy

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Colorectal cancer (CRC) remains a major health challenge, with limited success in immunotherapy due to the tumor-infiltrating regulatory T cells (ti-Tregs) suppressing anti-tumor activity. Recent studies indicated that CCR8 could be the biomarker for ti-Tregs, and eliminate the ti-Treg is required for treatment. My research explores a novel approach combining CCR8-targeting radioimmunotherapy (RIT) with immune checkpoint inhibitors (ICIs) to enhance CRC treatment efficacy. Using animal models MC38 and CT26, we aim to determine the optimal antibody form, dose, and dose of CCR8-targeting RIT to achieve ti-Treg depletion. Additionally, we evaluate the synergistic effects of RIT with anti-PD-1 and anti-CTLA-4 therapies on tumor response and the tumor microenvironment. Combining radioimmunotherapy with immunotherapy has the potential to improve clinical outcomes for CRC patients in the future.

Activated T cell radioimmunotherapy synergizes with fingolimod (Gilenya™) in a multiple sclerosis mouse model

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Introduction: Multiple sclerosis (MS) is a chronic, neurodegenerative autoimmune disease caused by inappropriate activation of the immune system to central nervous system antigens, such as myelin. Current therapies control the disease through the depletion of $CD20^+$ B cells and/or sequestration of T lymphocytes in the lymph nodes. While these are effective approaches, the complete ablation of B cells through CD20 monoclonal antibodies and immunomodulation of T cells can result in serious side effects such as immune function impairment and increased susceptibility to infection. A targeted approach to deplete only activated T lymphocytes, a key player in disease progression, would be optimal.

Here we report the enhanced therapeutic performance of a T cell targeted radiopharmaceutical in conjugation with the FDA approved MS therapeutic fingolimod (FTY720/Gilenya™). **Methods:** Female 9-week-old C57Bl/6 mice were immunized against myelin oligodendrocyte protein 35-55 (MOG^{35-55}) and were injected with pertussis toxin to develop experimental autoimmune encephalomyelitis (EAE), a mouse model of multiple sclerosis. At onset of paralysis (Day 11), animals (n=7/group) were randomized to receive beta radiation emitting Lutetium-177 radiolabeled anti-PD-1 antibody (^{177}Lu-αPD-1, 2.22 MBq), ^{177}Lu-αPD-1 (2.22 MBq) in combination with 0.4 mg/kg FTY720 x 7 days, 0.4 mg/kg FTY720 x 7 days or saline. We then performed single-photon emission computed tomography (SPECT/CT) imaging of a gamma radiation emitting Indium-111 radiolabeled anti-PD-1 antibody (^{111}In-aPD-1) in animals treated with and without FTY720. Finally, we performed flow cytometry and immunohistochemistry on CNS tissue obtained from treated mice. **Results:** A therapeutic combination of FTY720 + ^{177}Lu-αPD-1 significantly reduced overall disease severity in EAE mice compared to ^{177}Lu-αPD-1 alone, FTY720 and untreated controls. Flow cytometry analysis of mononuclear cells in the spinal cords showed significant reduction of infiltrating $CD8^+$ T cells in spinal cords of ^{177}Lu-αPD-1 + FTY720 and ^{177}Lu-αPD-1 compared to untreated and FTY720 alone. SPECT/CT imaging of ^{111}In-αPD-1 and ^{111}In-αPD-1 + FTY720 showed significant uptake in cervical draining lymph nodes, with FTY720 enhancing anti-PD-1 antibody retention in the lymph node by 96 hours post injection. Immunohistochemistry of combination ^{177}Lu-αPD-1 + FTY720 showed reduction of demyelination in thoracic spinal sections and reduced accumulation of activated $PD\text{-}1^+$ cells. **Significance:** ^{177}Lu-DOTA-αPD-1 in combination with FTY720 exhibited potent paralysis reduction in the EAE model. SPECT/CT imaging supports the findings with increased retention of anti-PD-1 antibody in the draining lymph nodes after treatment with FTY720. These results support a proof of principle for development of T cell targeted radiopharmaceuticals as potential "theranostic" agents for treatment of autoimmune disease and can potentially enhance already clinically approved MS therapeutics.