

College of Pharmacy, University of Manitoba Project Descriptions for Visiting Scientist Researchers (Master's)

Contents

Anna Chudyk, PhD	2
Sherif Eltonsy, PhD	4
Kaarina Kowalec, PhD	6
Ted Lakowski, PhD	7
Shweta Mital, PhD	8
Samantha Pauls, PhD	9
Payam Peymani, PharmD, PhD	10
Dake Qi, MD, PhD	12
Geoff Tranmer, PhD	13
Abdullah Maruf, PhD	14
Yannick Traore, PhD	15
Hamdah Al Nebaihi, PharmD, PhD	16

Anna Chudyk, PhD

Assistant Professor: <https://umanitoba.ca/pharmacy/faculty-staff/anna-chudyk>

Project Title: Building Reciprocal Relationships Between Researchers and Community Organizations Representing Underrepresented Populations in Manitoba

Project Overview and Rationale

Patient engagement in research refers to the meaningful and active involvement of patients, caregivers, and community organizations as partners throughout the research process. Instead of contributing data to a study, these individuals and organizations help shape research priorities, inform study design, interpret findings, and guide how knowledge is shared and used. Communities who are structurally marginalized and underrepresented in research -- such as newcomers and refugees and people living with poverty -- continue to be least likely to be meaningfully engaged in research processes. As a result, research agendas, methods, and outcomes often fail to reflect the priorities, realities, and strengths of these communities, perpetuating inequities and limiting the real-world impact of research.

Community organizations frequently act as intermediaries between academic researchers and the populations they serve, supporting recruitment, advising on study design, and helping navigate issues of trust, access, and cultural safety. Yet these organizations are often engaged in a transactional, project-by-project manner rather than through sustained, reciprocal partnerships. This project responds directly to calls for more equitable, community-driven research relationships by centering the perspectives of community organizations themselves and identifying how research teams can build authentic, long-term partnerships before a specific study or funding opportunity arises.

Project Objectives

The objectives of this qualitative study are to:

1. Explore community organizations' current experiences of working or partnering with researchers (e.g., for recruitment, consultation, or patient engagement activities).
2. Understand perceived facilitators, barriers, and burdens associated with acting as intermediaries between researchers and community members.
3. Identify principles and practical strategies for building reciprocal and sustained relationships between research teams and community organizations outside of project-specific needs.

Methods and Community Context

To meet the study objectives, the Visiting Student Researcher will help conduct, analyze, and synthesize 1-on-1 semi-structured qualitative interviews with representatives of Winnipeg-based and Manitoba-wide community organizations that support populations who are often underrepresented in

Chudyk, continued.

research, such as newcomer and refugee support agencies (e.g., Immigrant Centre Manitoba; Welcome Place/Manitoba Interfaith Immigration Council; Manitoba Association of Newcomer Serving Organizations) and organizations supporting people living with poverty (e.g., End Homelessness Winnipeg; North End Women's Centre; Spence Neighbourhood Association; Community Financial Counselling Services).

Training Environment and Outputs

The student will receive mentored training in qualitative research design and conduct, patient and community engagement ethics and frameworks, and thematic analysis. Expected outputs include a brief practice-oriented report for academic researchers and community partners, a co-developed set of principles for reciprocal engagement with community organizations, and a scholarly manuscript or conference abstract. This project aligns with the SHARE Lab's broader program of research on meaningful and equity-oriented engagement practices and strengthening the social infrastructure of patient-centred learning health systems.

Sherif Eltonsy, PhD

Associate Professor: <https://umanitoba.ca/pharmacy/faculty-staff/sherif-eltonsy>

Project 1: Trends and Determinants of Opioid Prescribing During Pregnancy in Manitoba

Opioid use complicates 5-8% of pregnancies, with Manitoba data showing declining codeine alongside rising potent agents (oxycodone, hydromorphone), potentially linked to rural pharmacy access limitations, preterm labor risks, and opioid agonist therapy (OAT) gaps. Rural pregnant individuals experience obstetric/pain service shortages, driving empiric prescribing disparities versus urban multidisciplinary care. This study aims to characterize temporal trends, rural vs urban disparities, and determinants of prenatal opioid exposure using population-based administrative data.

We will leverage mother-infant linked records from the Manitoba Population Research Data Repository (March 2000 - March 2025) to construct a cohort of all pregnancies (live births, stillbirths) with opioid dispensations. Quarterly prevalence by trimester will be stratified by rural vs urban maternal residence, agent type (e.g. codeine, potent opioids), dose intensity (morphine milligram equivalents >50/day), duration (>30 days), and maternal comorbidities (hypertension, mental health, substance use disorder, etc). Descriptive analyses will quantify utilization rates and yearly patterns. Multivariable Poisson regression will identify determinants of high-risk exposure, adjusting for maternal age, parity, income quintile, antenatal visits, and preterm delivery. Interrupted time series analysis will evaluate provincial opioid guidelines, codeine advisories, and rural midwifery expansions.

Findings will highlight geography-based inequities in pregnancy-safe pain management, informing targeted OAT integration, rural obstetric protocols, and neonatal risk stratification to optimize maternal-fetal outcomes across Manitoba.

Student Role: The student will conduct a targeted literature review, develop the analysis plan for cohort creation and descriptive trends, perform stratified prevalence/incidence analyses, and contribute to multivariable modeling under direct supervision. They will co-author a manuscript for a pharmacoepidemiology journal and prepare an abstract for presentation at national/international conference, gaining hands-on experience in Pharmacoepi methods, and knowledge translation within an intensive timeline.

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Project 2: Rural vs Urban and Sex-Specific Patterns of Opioid Initiation After Hospital Discharge Among Older Adults in Manitoba

Post-discharge opioid prescribing represents a critical transition period where 20-30% of older adults transition to chronic use, particularly vulnerable during recovery from surgery, fractures, or exacerbations of chronic conditions. Rural hospital-to-home transitions lack robust follow-up compared to urban settings with integrated primary care networks, potentially prolonging opioid exposure, while sex differences in postoperative pain trajectories and discharge planning may compound continuation risks. This study aims to examine temporal trends, rural vs urban disparities, and sex-specific patterns of opioid initiation and persistence after acute care hospitalization among older adults using population-based data.

We will analyse linked records from the Manitoba Population Research Data Repository (March 2010–March 2025) to identify adults aged ≥ 65 years with incident opioid dispensing within 7 days of hospital discharge. Quarterly incidence of post-discharge chronic opioid use (≥ 90 days within 6 months), dose escalation, and extended-release formulation initiation will be stratified by sex, rural vs urban residence, and admission diagnosis (surgery, fracture, cardiorespiratory). Descriptive analyses will track opioid-naïve vs prior exposure status, prescriber specialty at discharge, and primary care follow-up timing. Multivariable Cox proportional hazards models will assess determinants of prolonged therapy, adjusting for age, income quintile, LTC status, discharge diagnosis, length of stay, and comorbidity burden. Interrupted time series analysis will quantify guideline impacts on discharge prescribing protocols and transitional care pathways.

Results will highlight transition-related opioid risks across geography and sex, supporting standardized deprescribing algorithms and enhanced rural follow-up to prevent chronicity in Manitoba's hospitalized senior population.

Student Role: The student will conduct a targeted literature review, develop the analysis plan for cohort creation and descriptive trends, perform stratified prevalence/incidence analyses, and contribute to multivariable modeling under direct supervision. They will co-author a manuscript for a pharmacoepidemiology journal and prepare an abstract for presentation at national/international conference, gaining hands-on experience in Pharmacoepi methods, and knowledge translation within an intensive timeline.

Kaarina Kowalec, PhD

Associate Professor: <https://umanitoba.ca/pharmacy/faculty-staff/kaarina-kowalec>

Examining Intersections of Biographies & Biologies: Diversity & Outcomes of People with Multiple Sclerosis in Canada (iBio2Div-MS)

Health outcomes in multiple sclerosis (MS) are heterogeneous. It is unclear how much of this heterogeneity is attributable to genetic architecture versus biographical experiences or both. We will apply the biosocial pathogenesis model, conceptualizing outcomes in MS as arising from the combined and interacting effects of biology (with genetics as a central component) and biographical factors. We will focus on groups underrepresented in prior MS research, including people who identify as men, 2SLGBTIQ+, immigrants, rural residents, or individuals who live with a disability that interferes with daily activities. First, we will develop multi-ancestry polygenic scores (PGS) specific to Canadians using three data sources and will be augmented with large international cohorts. The PGS will target comorbidities relevant to MS, including obesity, heart disease, type 2 diabetes, and depression. These PGS will be validated in the 'iBio2Div-MS' cohort, which will recruit 500 people with MS (pwMS)/100 individuals without MS from underrepresented groups. iBio2Div-MS participants will complete four interviews over three years and provide a saliva sample for genetic analysis. Analyses will examine the joint contributions of biological and biographical factors on MS. Future work will focus on using genetic information to quantify heterogeneity and to test gene-biography interactions in pwMS. This will inform the co-creation of an integrated biosocial approach in the standard clinical management of pwMS in Canada.

Ted Lakowski, PhD

Professor: <https://umanitoba.ca/pharmacy/faculty-staff/ted-lakowski>

Acute myeloid leukemia (AML) is an aggressive blood cancer, accounting for approximately 80% of acute leukemia cases and an estimated 150,000 new cases worldwide in 2021. Despite advances in treatment, the 5-year survival rate remains low (approximately 30%), highlighting the need for new therapies.

The homeobox A (HOXA) genes encode a conserved family of transcription factors (TFs) whose overexpression drives several cancers, including AML. HOXA genes regulate hematopoietic development and are expressed in stem and progenitor cells but are largely silenced in differentiated cells. Aberrant expression of HOXA9 and HOXA10 promotes progenitor-cell proliferation, blocks differentiation, and drives AML. To function normally, HOXA proteins must interact with partners such as PBX1-3 and MEIS1, which are also implicated in AML. Consequently, HOXA9-10, PBX1-3, MEIS1, and their associated complexes are validated therapeutic targets in AML. We are developing inhibitors of these TFs and their complexes for the treatment of AML.

The student will test candidate inhibitors of these TFs in AML cell lines. Successful TF inhibitors will be evaluated in cell line-derived xenograft mouse models. Changes in gene expression and histone modifications will be quantified using quantitative polymerase chain reaction (qPCR) and liquid chromatography-tandem mass spectrometry (LC-MS/MS), respectively. This project will contribute to the development of new AML therapies that are more effective than existing treatments.

Shweta Mital, PhD

Assistant Professor: <https://umanitoba.ca/pharmacy/faculty-staff/shweta-mital>

Effectiveness and Cost-Effectiveness of Novel Interventions for Diabetes and Obesity

Several novel and promising therapies have recently emerged for patients with obesity with or without type 2 diabetes. However, the comparative effectiveness and economic value of these therapies relative to existing interventions remain uncertain. This project will evaluate effectiveness and cost-effectiveness of emerging therapies such as retatrutide, orforglipron, and MariTide. The student will review the literature, extract published trial data, and assist with preliminary economic analyses.

The ideal candidate will have strong quantitative and analytical skills, as well as excellent writing skills. Prior experience in cost-effectiveness analyses of healthcare interventions is strongly preferred.

Samantha Pauls, PhD

Assistant Professor: <https://umanitoba.ca/pharmacy/faculty-staff/samantha-pauls>

Background: Gestational diabetes mellitus (GDM) is the most common complication of pregnancy, affecting 5-10% of all pregnancies in Canada. GDM imposes long-term health risks to both mother and child. For example, fetal exposure to maternal GDM substantially increases the risk of developing chronic metabolic diseases in youth and young adulthood, including type 2 diabetes (T2D) and Metabolic Dysfunction-Associated Steatotic Liver Disease (MASLD). Rodent models have allowed us and others to begin examining key mechanisms of GDM risk transmission from mother to offspring. Our collaborators (Drs. Dolinski and Doucette) found that GDM-exposed offspring develop dysfunction in the pancreas and liver, which is worsened considerably by a post-natal high calorie diet.

Chronic inflammation is a known risk factor and proposed driver of metabolic diseases like T2D and MASLD. When metabolic tissues are stressed, for example by a sustained excess of nutrients such as in a high calorie diet, immune cells are called in to help. However, if the stress persists, inflammation becomes chronic and contributes to further tissue dysfunction. Offspring of GDM mothers are exposed to multiple proinflammatory stimuli including hyperglycemia, placental inflammation and, in many cases (including in rodent models), diet-induced obesity. We propose that these exposures may prime or program immune cells to respond more vigorously to inflammatory stimuli later in life through a process called “innate immune memory”.

Hypothesis: Rodents that were previously exposed to GDM during fetal development will have exaggerated tissue inflammation in response to high fat diet feeding, evidenced by higher numbers of pro-inflammatory (M1) macrophages and lower numbers of pro-resolving (M2) macrophages in pancreatic islets and in the liver.

Methods: We will examine pancreas and liver tissue sections from four groups of mice, harvested at 15-weeks of age by the Dolinsky lab: (i) non-GDM exposed and weaned onto a low fat (LF) diet; (ii) non-GDM exposed and weaned onto a high fat and sucrose (HFS) diet; (iii) GDM-exposed, weaned onto a LF diet; (iv) GDM-exposed, weaning onto a HFS diet. We will perform immunofluorescence staining to identify pro-inflammatory M1 macrophages (expressing F4/80 and iNOS markers) and pro-resolving M2 macrophages (expressing F4/80 and CD206 markers) in tissue sections, counting them relative to total nuclei. Pancreas sections will be co-stained for insulin to identify islet borders.

Impact: This project examines how tissue inflammation is impacted by exposure to GDM during fetal development. This is an important step towards understanding how GDM-induced immune dysregulation contributes to increased risk of chronic metabolic disease later in life. Ultimately, our goal is to find new ways to mitigate this risk to preserve the health and well-being of youth and young adults born to GDM mothers.

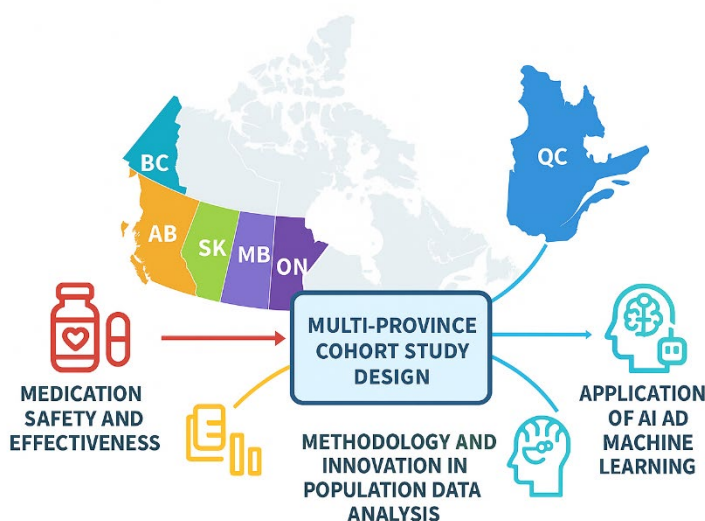
Payam Peymani, PharmD, PhD

Assistant Professor: <https://umanitoba.ca/pharmacy/faculty-staff/payam-peymani>

Population therapeutics and health outcomes research

Research Themes:

- Medication safety and effectiveness: Cardiovascular, Diabetes, Antiretroviral therapy, etc.
- Advancing statistical methods, epidemiological designs, and simulation modeling with large health databases
- Leveraging artificial intelligence and machine learning to identify medication risks, improve patient outcomes, and support decision-making



Population-Based Analyses of Medication Utilization, Safety, and Temporal Trends Using Linked Health Data

Project Abstract

Understanding how medications are used in real-world settings, and how prescribing patterns evolve over time, is essential for optimizing patient safety, treatment effectiveness, and equitable access to care. This project will focus on population-based analyses of medication utilization and safety using linked administrative health and prescription data from Manitoba, across Canada, a universal healthcare setting with long-standing, high-quality data infrastructure. The research will emphasize descriptive and longitudinal pharmacoepidemiologic methods to characterize real-world prescribing patterns across different populations and medication classes. The primary objective is to examine temporal trends in medication use, regimen composition, and treatment uptake over extended periods, with attention to changes following major clinical guideline updates, policy shifts, or the introduction of new therapies.

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Depending on the matched student's background and interests, the project may be tailored to specific therapeutic areas of high public health relevance, such as antiretroviral therapy for HIV, stimulant medications used in pediatric populations, antidiabetic medications, or other commonly prescribed drug classes. All projects will remain non-clinical and observational in nature, in line with program and immigration requirements. Analyses will rely on linked prescription, demographic, and health service data and will use established descriptive and longitudinal methods common to population health and pharmacoepidemiology research. The Visiting Student Researcher (VSR) will contribute to cohort definition, literature review, systematic review, meta-analysis, variable specification, descriptive and analytical analyses, and interpretation of findings under close supervision. Emphasis will be placed on reproducible analytic practices, careful interpretation of results, and clear communication of population-level evidence. This project will generate foundational evidence describing real-world medication use and its evolution over time, providing essential context for subsequent studies of safety, effectiveness, and health equity. Findings will be relevant to clinicians, researchers, and policy stakeholders and are expected to be suitable for dissemination at academic conferences and, where appropriate, peer-reviewed publication. The project is well suited to a 3–4-month research placement and offers structured training in population health research, pharmacoepidemiology, and medication safety.

Suggested Skills and Background:

- Background in pharmacy, epidemiology, public health, or health sciences
- Interest in medication use research or population health
- Experience with statistics, data analysis, or programming (e.g., R, SAS, or Stata) is an asset
- Analytical thinking and scientific writing skills

Dake Qi, MD, PhD

Associate Professor: <https://umanitoba.ca/pharmacy/faculty-staff/dake-qi>

White adipose tissue (WAT) not only stores excess energy, but it is an endocrine organ system responsible for the synthesis and secretion of bioactive proteins (hormones or inflammatory factors) in mammals. These bioactive molecules have diverse effects on metabolism, inflammation, immunity, cardiovascular function, and more. Macrophage migration inhibitory factor (MIF) was originally discovered in immune cells (macrophage/monocyte) as an upstream regulator of the innate immune response in mammals. However, MIF is also highly expressed in WAT and its release plays a key role in regulating energy metabolism. Adipose MIF secretion is dependent on pre-formed MIF storage pools or new MIF synthesis (MIF transcriptional expression) in WAT. MIF synthesis is regulated by transcriptional mechanisms, as higher MIF expression and synthesis contribute to higher MIF secretion from WAT. However, it remains unclear how the expression of adipose MIF is regulated. Thus, the current project is to investigate the underlying signaling cascades involved in regulating MIF synthesis in adipocytes. Specifically, we will study the role of dopamine receptor 1 (DRD1) in regulating MIF expression and release by utilizing various techniques in molecular and cellular biology including qPCR, western blot and ChIP etc. The mechanisms that mediate MIF expression will be an important effort to unravel the endocrine function of WAT and discover how WAT coordinates whole-body metabolism. Our findings might have a long-term impact on human diseases and animal biology and physiology.

The visiting student researchers will receive training in cell culture (such as 3T3-L1 cell culture and differentiation) and molecular biology techniques, and will use these techniques to conduct mechanistic studies.

Geoff Tranmer, PhD

Professor: <https://umanitoba.ca/pharmacy/faculty-staff/geoffrey-tranmer>

Development of Boron Containing Therapeutic Agents

Abstract: The invention of new therapeutic agents based on structure-based drug design is an increasingly important area of research that seeks to use the current knowledge-base of a biological target as a foundation from which to develop new medications. The main objective of this proposal is to use boron-containing functional groups and structure-based drug design to develop new therapeutic agents. Our research proposal will leverage the current biological understanding of boron medicinal chemistry and develop new small molecule inhibitors based on the known three-dimensional structure of known enzymes and lead to the development of new therapeutic agents. We propose to incorporate specialized boron-containing functional groups within these drug candidates that will result in reversible covalent interactions between the drug itself and the enzyme, leading to new modes of enzymatic inhibition. Overall, we hypothesize that using structure-based drug design, in co-operation with boron-containing functional groups, we will be able to synthesize new compounds that will inhibit enzymes relating to bacteria, viruses, cancer and/or neurodegeneration.

Student's Role: The exchange student will synthesize new drug analogs relating to prospective patent applications and assist in the study of the therapeutic properties of the compounds using various biochemical assays, and/or in vitro and in vivo models. This is a medicinal chemistry project where the student will synthesize new molecules on a daily basis, and assist in the testing of their therapeutic properties with the assistance of a senior doctoral student. Additionally, the student may also perform some in vitro cell based assays, following proper training. Overall, the student will spend the exchange making new candidate drug molecules relating to our prospective patent that will lead to the development of next generation therapeutic agents. Depending on the start date, the project itself may be in the area of anticancer agents, antivirals, antibacterials, or new agents for the treatment of neurodegeneration or diabetes, depending upon our group's most recent result at the start of the exchange.

Abdullah Maruf, PhD

Assistant Professor: <https://umanitoba.ca/pharmacy/faculty-staff/abdullah-al-maruf>

Real-World Implementation of Pharmacogenetic-Guided Psychotropic Prescribing in Primary Care

Background: Psychotropic medications are widely prescribed for depression, anxiety, and other psychiatric disorders; however, treatment response and tolerability vary considerably among individuals. Consequently, many patients experience prolonged trial-and-error prescribing before achieving adequate symptom control. Pharmacogenetic (PGx) testing offers a precision medicine approach by incorporating genetic variation that influences drug metabolism and response into prescribing decisions. Evidence-based guidelines from the Clinical Pharmacogenetics Implementation Consortium (CPIC) and the Dutch Pharmacogenetics Working Group (DPWG) provide genotype-guided prescribing recommendations for several commonly used psychotropic medications.

Objective: To evaluate PGx actionability, genotype-prescribing concordance, and changes in psychiatric symptom burden following PGx-guided care among adults receiving psychotropic medications in primary care in Manitoba.

Methods: Adults (≥ 18 years) enrolled in the PGx-SUPPORT study who are receiving psychotropic medications in primary care will be included. Participants undergo multigene PGx testing, with analyses focused on clinically actionable genes (*CYP2C19*, *CYP2D6*, *CYP2B6*, and *CYP3A4*). Baseline demographic and clinical characteristics will be summarized using descriptive statistics. PGx actionability and genotype-prescribing concordance will be assessed according to CPIC and DPWG recommendations. Changes in psychiatric symptoms over three months will be evaluated using the DSM-5-TR Level 1 Cross-Cutting Symptom Measure (DSM-XC), Patient Health Questionnaire-9 (PHQ-9), and Generalized Anxiety Disorder-7 (GAD-7), with appropriate paired statistical analyses, with corresponding effect sizes reported. Exploratory analyses will examine associations between the implementation of PGx-guided prescribing recommendations and changes in patient-reported outcomes.

Expected Impact: This study will generate real-world Canadian evidence on the implementation and potential clinical impact of PGx-guided psychotropic prescribing in primary care. Findings will inform strategies for integrating precision medicine into primary care mental health services, with the goal of improving medication effectiveness, safety, and patient outcomes.

Role of the Student: Under faculty supervision, the student will collaborate with members of the research team and contribute to PGx guideline interpretation, literature review, statistical analyses, interpretation of findings, and dissemination of results through research presentations.

Yannick Traore, PhD

Assistant Professor:

Project: Developing an mRNA LNP Platform for Breast Cancer Immunotherapy

Breast cancer's biological heterogeneity limits the effectiveness of conventional surgery, chemotherapy, and immunotherapy, motivating a shift toward personalized treatment built on each patient's tumor mutations. This program integrates neoantigen discovery, mRNA-based vaccination, and lipid nanoparticle (LNP) delivery to build a platform for personalized breast cancer immunotherapy. The aim of this project is to develop an innovative personalized mRNA vaccine delivery platform to target breast cancer. Rather than treating the LNP as a passive carrier, it will be designed as an active immunomodulator, with lipid composition, particle size, and targeting ligands tuned to direct the vaccine to lymph nodes and dendritic cells while providing its own adjuvant activity.

A Publicly sourced reporter mRNA construct conjugated to a fluorescent tag will be used as a standardized cargo. This reporter mRNA will be formulated into a panel of LNP variants that differ in ionizable lipid chemistry, particle size, dendritic-cell-targeting ligands, and adjuvant content, generating a quantitative map linking LNP physicochemical design to immune-cell uptake, maturation, and epitope presentation. The top-performing formulations will be used for the downstream evaluation of validated neoantigens.

Student Role: Using a ready-made reporter mRNA (sourced from a commercial supplier or public repository), the student will focus on the delivery side of the platform: formulating LNP variants by microfluidic mixing across the lipid/ligand/adjuvant test matrix, and characterizing particle size, surface charge, and encapsulation efficiency.

Hamdah Al Nebaihi, PharmD, PhD

Assistant Professor: [Hamdah Al Nebaihi, PharmD, PhD | LinkedIn](#)

Individualizing Phenytoin Dosing with Pharmacometrics Modelling

Can a single early blood level guide dosing for a drug with unpredictable pharmacokinetics in the clinical setting?

Overview

Phenytoin is a mainstay of urgent seizure control and one of the most challenging drugs to dose because it has a narrow therapeutic window (10–20 mg/L). In addition, its elimination is capacity-limited, with the enzymes responsible for clearing the drug becoming saturated within the therapeutic range. Consequently, a small increase in dose can result in a disproportionate increase in blood concentrations and, in some cases, lead to toxicity. Patients also vary widely in how quickly they metabolize phenytoin. In critically ill patients, the routine total drug concentration can be misleading because low albumin levels increase the active free fraction of the drug.

Clinicians are therefore left trying to reach a narrow therapeutic target both quickly and safely. The risks are particularly high when seizures do not stop, as every additional hour of uncontrolled status epilepticus adds to the risk of lasting neurological injury.

Hypothesis

A patient's own early therapeutic drug monitoring level, combined with population-level knowledge of how phenytoin behaves (a technique called Bayesian forecasting), can accurately predict their subsequent concentrations and individual dose requirements, allowing faster and safer dosing even from a single non-steady-state sample.

Method

Using anonymized data collected during routine clinical care, you will build and validate a population pharmacokinetic model of phenytoin using industry-standard software (Monolix). You will then use Bayesian forecasting to individualize predictions for each patient from sparse data, and simulation (Simulx) to explore optimal dosing strategies and determine appropriate re-dosing intervals following a toxic concentration.

"No prior modelling experience is required, curiosity about data and pharmacology is what matters"

Outcomes

This project aims to develop a decision-support tool that could help clinicians achieve therapeutic phenytoin levels more quickly during seizure emergencies, reduce the risk of toxicity, and personalize dosing for patients who may not be well served by standard dosing approaches.

What you'll learn: You will gain hands-on experience in pharmacokinetic modelling and simulation, using tools that are increasingly used in both academic research and the pharmaceutical industry. You will also learn about (1) Personalized drug dosing (2) Factors affecting drug disposition in the body (3) Therapeutic drug monitoring and pharmacokinetics (4) Translating pharmacological data into clinically relevant applications.

Depending on the scope of the project and starting date, you may also can conduct *in vitro* studies to investigate potential drug–drug interactions and their effects on drug disposition.