M | PHARMACY

Personalize Medicine For Patients

What is Precision Pharmacotherapy Research? (PPR)

PPR moves away from a one-size-fits-all approach to treating patients. Instead, PPR researchers use patient factors, such as demographics, kinetics, genetics, metabolomics and proteomics to identify what is causing some patients not to respond to treatment or experience side effects.

Is the PPR Track Right For You?

- You are interested in tailoring medication selection, dosage and timing to individual patients based on their unique characteristics.
- You are curious why a medication may or may not be effective, or may cause side effects, based on the unique makeup of individuals (e.g., disease and therapeutic phenotyping).
- You want to determine why some medications work for one person but not for another.
- You are passionate about patients' individual genetic makeup or what pre-medication biochemical (e.g., bloodwork and lab levels) signals predict response to medications.

Let's share some research topics and methods that you could be a part of or use in this program.

Research Topics

- Clinical Biomarkers (Age/Nutrition/Body Size)
- Drug Concentrations (Pharmacokinetics)
- Drug Responses (Pharmacodynamics)
- Patient Genetics (Pharmacogenomics)
- Biochemical Biomarkers (Pharmacometabolomics, Pharmacoproteomics)
- Clinical Translation and Implementation
- Precision Dosing

Research Methods

- Pre-Clinical Studies
- Data Mining and Analysis
- Analytical Chemistry
- Artificial Intelligence
- Machine Learning
- Biobanks
- Secondary Data Analysis
- Translational Clinical Studies
- Observational Studies
- Advanced Statistical Techniques

Our Faculty Are Experts and Are Eager to Mentor You

Optimal Dosing in Specific Patient Populations

Execute translational clinical pharmacology research that focuses on underrepresented patients in clinical trials, specifically people with obesity or with liver or kidney insufficiency. Research in this space focuses on getting the right dose to the right person to ensure medicines are safe and effective.

Meet Dr. Pai

Translating Biomarkers Into Cancer Treatment

Explore how a patient's genetics or other biomarkers influence their response to cancer drugs, focusing on the prevention of chemotherapy-induced peripheral neuropathy (CIPN) or severe chemotherapy toxicity (DPYD Testing).

Meet Dr. Hertz

Improve Cardiovascular Medication Outcomes with Pharmacogenomics

Center your research on patient genetics and their responses to cardiovascular medications like those for heart failure, high cholesterol, abnormal heart rhythms and heart attacks with the overall goal of improving cardiovascular medication outcomes using precision medicine.

Meet Dr. Luzum

Metabolomics, Critical Care and Pulmonary Delivery of Therapeutic Proteins

Specialize your research on critical illnesses, particularly Sepsis and Acute Respiratory Distress Syndrome (ARDS). The goals of this type of research include using metabolomics to:

1. Understand what drives responses to specific pathogens in critical illnesses.
2. Identify biomarkers in the blood that predict therapeutic response.
3. Find metabolic patterns or genetic differences (patient phenotyping).
4. Identify biomarkers to improve targeted pharmacotherapy.

Meet Dr. Stringer

Multi-Omics Informed Precision Pharmacotherapy

Get experience in research that involves integrating high-throughput genomic, proteomic and metabolomic data to identify key biomarkers underlying interindividual variability in pharmacokinetics and pharmacodynamics. A central component of this work is the development and application of advanced statistical and machine learning models to translate complex multiomics data into clinically actionable tools that enhance therapeutic safety and efficacy.

Meet Dr. Zhu