



EXPERTISE. INFLUENCE. IMPACT.

RESEARCH FACTS

As a top research school, the University of Maryland School of Pharmacy applies an integrative approach to drug discovery and development, innovative patient care, and drug outcomes and their economic impact. Researchers in the **Department of Pharmaceutical Sciences (PSC)** are identifying new drugs to treat drug abuse, cancer, neurodegenerative diseases, and infection. The **Department of Pharmaceutical Health Services Research (PHSR)** provides valuable information on the economic costs, safety, and public policy issues that arise once drugs and therapies have been made available to the public. The **Department of Pharmacy Practice and Science** is dedicated to advancing pharmacy practice through education, research, leadership and advocacy, and shapes the future of pharmacy by offering innovative teaching methods, and translating research discoveries and pharmacy practice innovations into exemplary patient care.

The School of Pharmacy has more than \$32.8 million in grants and contracts, with more than \$6.8 million of that funding from the National Institutes of Health.

PHARMACEUTICAL HEALTH SERVICES RESEARCH

Centers

- Peter Lamy Center on Drug Therapy and Aging
- Patient-Driven Values in Healthcare Evaluation
- Pharmaceutical Research Computing
- Center on Drugs and Public Policy

Programs

- Behavioral Health Research and Technical Assistance Program
- PATIENTS Program

Graduate Program

- The PHSR PhD program provides graduates with the theory, practical experience, and problem-solving skills needed to address a wide range of pharmacy and health services issues
- Adapted from the top-tier PhD in PHSR program, the MS in PHSR is geared towards experienced professionals who will gain the experience and decision-making skills needed to improve prescription drug use and health among diverse populations.
- Graduates secure jobs in academia, industry, and government agencies, including the Food and Drug Administration, the Agency for Healthcare Research and Quality, and the Centers for Medicare and Medicaid Services

Research Initiatives

- **Comparative Effectiveness Research:** Compares different health care and treatment approaches to help patient and providers make more informed decisions on care and coverage.
- **Pharmacoeconomics:** Examines the true value of pharmaceuticals by researching, among other variables, costs, expenditures, patient outcomes, quality of life, and budget impact of new technologies.
- **Pharmacoepidemiology:** Examines the use and the effect of drugs at the population level, and includes evaluation of appropriateness of drug use in vulnerable populations such as children and the elderly.
- **Pharmaceutical Policy:** Involves the development, provision and use of medications within a health care system, including regulatory issues, pricing, coverage and payment, and other similar topics.

Funding

- PHSR has more than \$6 million in grants and contracts from sources such as:
 - Agency for Healthcare Research and Quality
 - American Foundation for Pharmaceutical Education
 - Bayer Healthcare Pharmaceuticals, Inc.
 - BeiGene Ltd
 - GlaxoSmithKline
 - Maryland Department of Health
 - Maryland Department of Transportation
 - Merck Research Laboratories
 - National Institutes of Health
 - Novartis
 - Patient-Centered Outcomes Research Institute
 - Pharmaceutical Research and Manufacturers of America
 - Sanofi US

PHARMACEUTICAL SCIENCES

Centers

- Bio- and Nano-technology Center
- Center of Excellence in Regulatory Science and Innovation
- Center for Research on Complex Generics
- Computer-Aided Drug Design Center
- Mass Spectrometry Center
- Metallotherapeutics Research Center

Graduate Program

- The MS and PhD in PSC programs provide students with the knowledge and skills to direct the discovery of novel biological pathways in human disease and the development and delivery of medications for safe and effective therapy
- The Master of Science (MS) in Regulatory Science provides graduates with the knowledge and skills necessary to contribute to drug and biologics regulation and pharmaceutical product lifecycles.
- Graduates excel as leaders in the pharmaceutical and regulatory sciences, and have opportunities to gain excellent positions in academia and the pharmaceutical industry, or in government agencies such as the Food and Drug Administration and the National Institutes of Health

Core Capabilities and Facilities

- Applied Pharmaceutics Lab
- High-throughput Screening Facility
- Nuclear Magnetic Resonance
- Pharmacokinetics and Biopharmaceutics Laboratory

Research Initiatives

- PSC has significant strength in biomanufacturing and vaccine quality control, microbiology and antibiotics, drugs of abuse, and novel treatments for cancer through the use of:
- **Proteomics:** Determination of the underlying mechanism of disease through the function and dysfunction of proteins using mass spectrometry and cellular and structural biology

- **Drug Design and Discovery:** Translation of basic science discoveries into drug candidates through computer-aided target identification and ligand optimization, chemical synthesis and biochemical, biophysical and cellular assays
- **Drug Development and Translational Research:** Preclinical development, formulation, and delivery of new experimental therapeutics; drug metabolism and pharmacogenomics, with an emphasis on drug safety, toxicity, and efficacy

Funding

PSC has more than \$10.9 million in grants and contracts from a variety of agencies and organizations, such as:

- American Foundation for Pharmaceutical Education
- National Institutes of Health
- National Institute for Innovation in Manufacturing Biopharmaceuticals
- National Institute for Standards and Technology
- National Science Foundation
- U.S. Food and Drug Administration
- Various other public and private sources

PHARMACY PRACTICE AND SCIENCE

Centers

- Center for Innovative Pharmacy Solutions
- Center for Translational Medicine
- Maryland Poison Center
- Mental Health Program
- Peter Lamy Center on Drug Therapy and Aging

Programs

- ATRIUM Cardiology Collaborative
- Patients, Pharmacists, Partnerships (P3) Program
- Infectious Disease Collaborative
- Palliative Care Collaborative

Graduate Programs

- The online PhD, MS, and Graduate Certificates in Palliative Care program is designed to meet the educational needs of individuals who are currently working or who wish to work in hospice and palliative care and want to gain a deeper understanding of the physical, psychological, spiritual and social needs of patients and families affected by advanced illness, or those wishing to do so
- The MS in Pharmacometrics program allows current professionals to acquire skills and knowledge to plan, perform, and interpret pharmacometric analyses with the goal of influencing key drug development, regulatory, and therapeutic decisions. The 100% online program offers theoretical and applied technical knowledge together with necessary business skills tailored for the pharmaceutical sector.

Practice-Based Research Highlights

- **Cardiology**
 - The Applied Therapeutics, Research, and Instruction at the University of Maryland (ATRIUM) Cardiology Collaborative is focused on research and the pharmaceutical care of patients with cardiovascular diseases.
- **Palliative Care/Geriatrics**
 - Faculty are leading a group of international experts to develop guidelines for methadone use in hospice and palliative care patients, have been integral in creating a controlled substance emergency preparedness plan, are evaluating Part D MTM Technical Implementation, and developing safeguards in ambulatory care for veterans with chronic kidney disease.
- **Infectious Disease**
 - Research focuses on HIV and multidrug resistant pathogen prevention and patient outcomes.

Mental Health

- As a national leader in psychiatric pharmacy, the Mental Health Program partners with governmental agencies and national organizations to explore new roles for psychiatric pharmacists and develop unique pharmacist based solutions to treatment challenges in behavioral health. Program faculty and staff work with state agencies to improve access to naloxone, address the appropriate use and monitoring of children and adolescents with antipsychotic medications, analyze medication use and trends for Medicaid, the Behavioral Health Administration and the Maryland Prescription Drug Monitoring Program, pilot an innovative pharmacist program in medication assisted treatment for opioid use disorders, and assure the delivery of quality pharmacy services to patients receiving treatment in Maryland's public psychiatric hospitals.

Ambulatory Care

- Faculty research barriers and facilitating factors in transitions of care, improving care for children with chronic gastrointestinal illnesses, and management of heart failure in the elderly.

Toxicology

- Faculty are nationally renowned experts in clinical toxicology and clinical pharmacokinetics and provide real world solutions as new agents continue to be introduced to the market.

Translational Research

The Center for Translational Medicine (CTM) offers training, research, and services. It has a Master in Pharmacometrics program that is 100% online for working professionals. CTM also trains doctoral and postdoctoral fellows in the area of clinical pharmacology and pharmacometrics. CTM's research focuses on regulatory science, drug development tools, and precision therapeutics. CTM employs advanced and innovative analyses to create intelligence from information. The center analyzes and summarizes data from experiments and clinical trials using quantitative disease, drug, and trial models. In collaboration with key institutions, CTM is heavily invested in developing hospital decision support systems to individualize pharmacotherapy. It develops software, algorithms, and clinical trial evidence to make precision therapeutics a reality.

Educational Research

- The **Walgreens Objective Structured Clinical Examination (OSCE)** Suite helps student pharmacists practice their clinical skills in simulated real world situations.
- Research on the effectiveness of OSCEs to assess soft skills and preparedness of pharmacy students for advanced rotations has shown that OSCEs are an effective teaching instrument.

Innovations in Teaching

- Faculty have developed innovative teaching methods based on research that measures and analyzes the effectiveness of unconventional teaching methodologies and contemporary adult learning.

Funding

PPS has more than \$15.9 million in grants and contracts from a variety of agencies and organizations, including:

- Agency for Healthcare Research and Quality
- Centers for Disease Control and Prevention
- Econometrica/Centers for Medicare and Medicaid Services
- Maryland Department of Health
- MedStar Research Institute
- National Cancer Institute
- National Institutes of Health
- Patient-Centered Outcomes Research Institute
- U.S. Food and Drug Administration