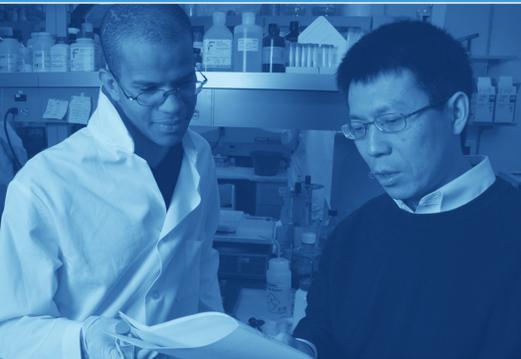




UNC

ESHELMAN SCHOOL
OF PHARMACY

Research Enterprise



**Drug
Discovery**



**Drug Development
and Evaluation**



**Care Delivery
and Practice**

Discovering the medicines of tomorrow. Maximizing the benefit of medicines today.

At the UNC Eshelman School of Pharmacy everything we do begins and ends with a patient in mind. We are focused on accelerating basic and translational science and commercializing bold ideas to find new therapies for the world's most prevalent illnesses.

Research Enterprise

Our highly-integrated research enterprise is made up of leading biopharmaceutical research scientists and state-of-the-art facilities that can help you drive the next wave of innovative therapeutics.

 **The Eshelman Institute for Innovation is the engine that drives our faculty discoveries forward. Strategic partnerships are what will bring them over the finish line. Together, we can Advance Medicine for Life.”**

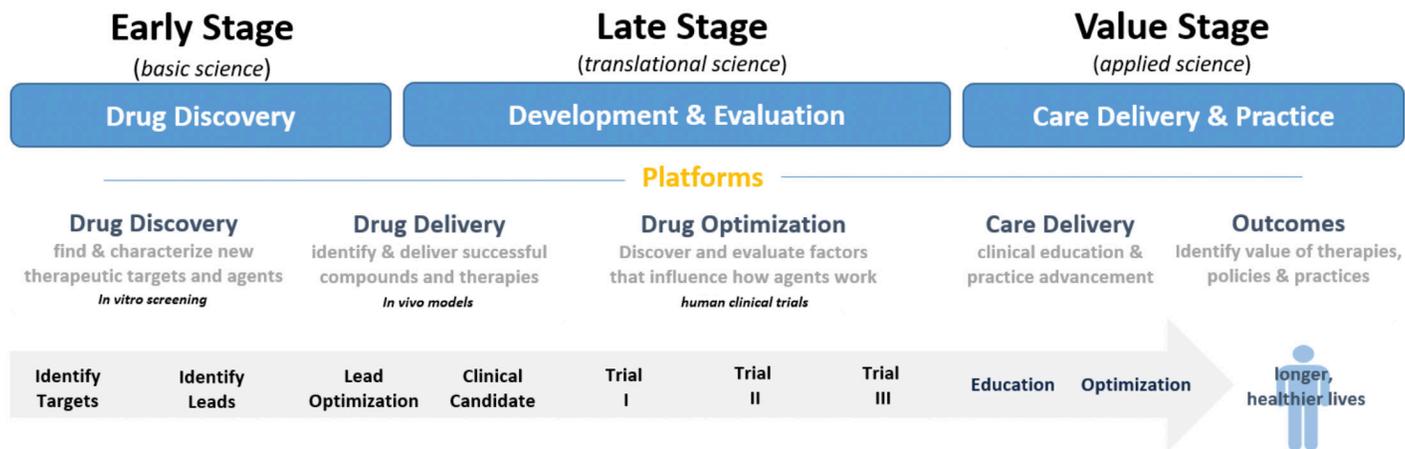
Angela Kashuba

Dean, UNC Eshelman School of Pharmacy

Research Enterprise

We are **Advancing Medicine for Life** through the discovery of medicines of tomorrow, maximizing the benefit of medicines today and training the next generation of pharmacists and pharmaceutical scientists.

Our dynamic and highly collaborative patient-focused biopharmaceutical research enterprise spans the entire drug development and delivery cycle. Everything we do begins and ends with a patient in mind.



Fast Facts

#1

School of Pharmacy

#2

in NIH Funding

#10

QS Rankings Pharmacy and Pharmacology

231

Active issued patents

48

Formed startups

161

Invention disclosures

Health Sciences Campus

The UNC Eshelman School of Pharmacy is part of the University of North Carolina at Chapel Hill, a major research university with a large teaching hospital and schools of medicine, public health, nursing, and dentistry as well as the UNC Lineberger Comprehensive Cancer Center. UNC-Chapel Hill is routinely ranked among the top five public universities in the nation.

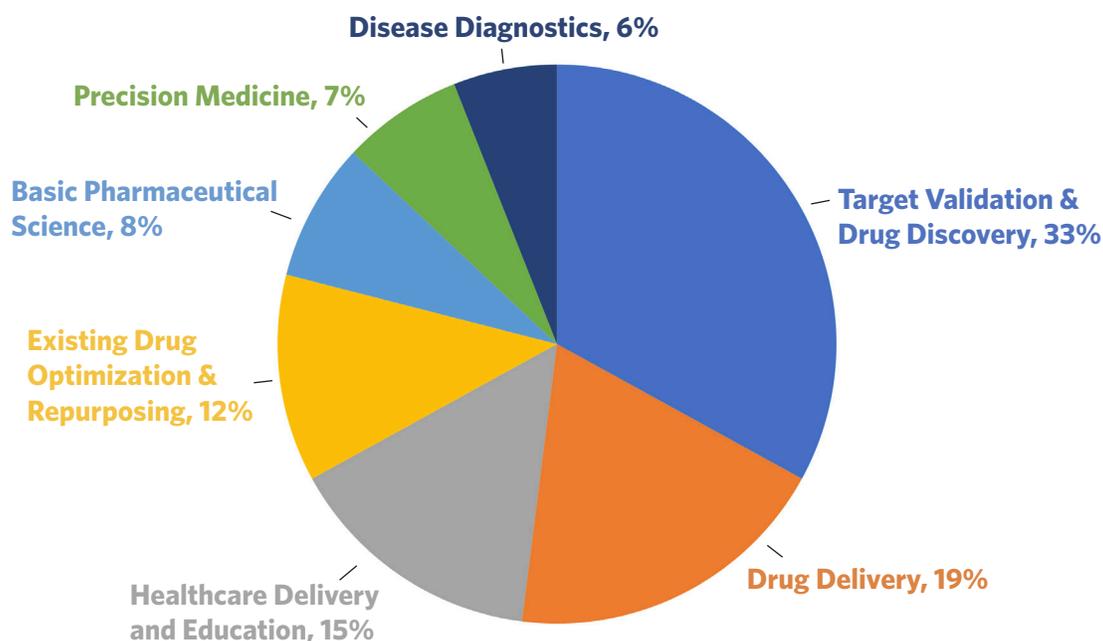
Research Triangle Park

UNC anchors one corner of North Carolina's famed Research Triangle Park, which hosts an abundance of pharmaceutical, biotech, and health care companies. This environment offers abundant opportunities for collaboration in research, education, and patient care with partners in academia, industry, and health care.

UNC Eshelman Institute for Innovation

The **Eshelman Institute for Innovation** at the UNC Eshelman School of Pharmacy was established in 2014 with a \$100 million commitment from Dr. Fred Eshelman. The Institute serves as an **Innovation Engine** enabling the School to pursue bold, new ways to advance pharmacy education, pharmaceutical research and pharmacy practice.

The Institute has awarded over \$25 million in grants to help innovators take the next step forward in **Advancing Medicine for Life**.



The Eshelman Institute for Innovation is focused on accelerating basic and translational science and commercializing bold ideas to find new solutions for the world's most devastating illnesses. As the No. 1-ranked pharmacy school in the nation, we have an unparalleled environment that fosters drug discovery, delivery and optimization.

We are looking for innovative collaborators who want to partner in groundbreaking research in chemical biology, nanotechnology, pharmacogenomics and individualized therapy in order to create therapies for cancer, neurological disorders and rare diseases, among others.

Division: Chemical Biology and Medicinal Chemistry

Drug Discovery: Cancer, Cardiovascular Disease, Autoimmune Diseases

Full-Time Faculty 32

Postdoctoral Fellows 34

PhD Students 34

Research Funding \$15M

Find and characterize therapeutic targets and agents:

- Synthetic Chemistry
- Medicinal Chemistry
- Chemical Biology
- Structural Biology
- Assay Development
- High Throughput Screening
- Neuropharmacology
- Structural Biology
- Rational Drug Design
- Computer-Aided Drug Design
- Cheminformatics

Chemical Biology and Medicinal Chemistry (CBMC) seamlessly blends chemistry and biology to develop and exploit novel chemical tools relevant to the fields of biochemistry, biology, pharmacology, and medicine. Research is directed toward biomedical and pharmaceutical discovery by applying both chemical and biological principles to interactions between molecular structure and biological activity.

Research spans activities in contemporary chemical biology and drug discovery and blends the principles and experimental techniques of chemistry and biology with computational science. While maintaining a traditional emphasis on the drug candidate, CBMC integrates contemporary biological methods to merge small molecule and target biomolecule research. This approach allows for elucidation of disease pathways and mechanisms of drug action. CBMC encompasses nearly all aspects of drug discovery, including bioactive natural products, organic chemistry, computational drug design, assay development, high throughput screening of chemical libraries, and studies in living cells.

CBMC has research strengths in the synthesis and structure-activity characterization of pharmaceutically relevant small molecules and natural products; bioorganic and chemical biology studies of the properties of designed small-molecule ligands and their cognate drug targets, including proteins, nucleic acids, and glycoconjugates; combinatorial biochemistry and proteomics for the identification of novel signaling pathways and drug targets; structural biology and biomolecular dynamics of drug-protein interactions; chemo- and bioinformatics; and molecular modeling.

Center for Integrative Chemical Biology & Drug Discovery



Director
Stephen Fry

Drug Discovery: Oncology & Chromatin Regulation

An innovative and sustainable scientific force in the creation of small molecule therapies:

- Small Molecule Probes
- Drug Leads
- Target Validation

Division: Pharmacoengineering & Molecular Pharmaceutics

Drug Delivery: Cancer, Infectious Diseases, Autoimmune Diseases

Full-Time Faculty 18

Postdoctoral Fellows 24

PhD Students 25

Research Funding \$10.1M

Identify and deliver successful compounds and therapies:

- Pharmacoengineering
- Nanomedicines and Nanotechnologies
- Gene Delivery
- Cell-Based Therapies
- Immunoengineering
- Analytical & Polymer Chemistry
- Molecular Pharmaceutics

Pharmacoengineering and Molecular Pharmaceutics (DPMP) deals with delivering and maintaining the desired amount of a therapeutic agent at the target site for a desired period of time and with cell-based therapies. The development of a drug or vaccine delivery system that accomplishes this is based on an understanding of their transport properties across biological barriers and subsequent biodistribution as well as the mechanism by which they are metabolized and eliminated.

These drug-delivery systems are tested in cell-based functional assays and/or human disease models in animals. Pharmacokinetic and pharmacodynamic assessments are the measure of performance of a given delivery system. The pharmacokinetics, be it at a subcellular/molecular level or an organ/tissue level, requires a sensitive and specific analytical method.

Our research is highly collaborative and involves improving the efficacy and delivery of a broad range of therapeutic agents, from small molecules to biologicals such as proteins, antibodies, oligonucleotides, genes, and cells. Current interdisciplinary specialties include:

- the design, fabrication, and evaluation of dosage forms and delivery strategies for conventional and biotechnology-based therapeutic agents;
- elucidation of barriers to systemic and target-specific drug delivery;
- determination of the ability of pharmacologic agents to reach the relevant site of biologic effect; and
- determination of the time course of biologic activity.

Center for Nanotechnology in Drug Delivery



Director

Alexander Kabanov

Drug Delivery: Cancer, Stroke, Neuro Disorders

Safely and effectively translating new drugs into clinical trials:

- Nanotechnology
- Chemistry and Biomaterials
- Therapeutic and Diagnostic Targets
- Nanotoxicology
- Phase I and II Clinical Trials

Division: Pharmacotherapy & Experiential Therapeutics

Drug Optimization: Oncology, Cardiology, Infectious Diseases, Autoimmune Diseases

Full-Time Faculty 29

Postdoctoral Fellows 31

PhD Students 18

Research Funding \$9.2M

Discover and evaluate the factors that influence how therapeutic agents work

- Clinical Pharmacology
- Experiential Therapeutics
- Pharmacotherapy
- Clinical & Translational Research
- Pharmacometrics
- Pharmacogenomics
- Drug Toxicity
- Drug Metabolism & Transport
- Precision Dosing

Pharmacotherapy and Experiential Therapeutics (DPET) works to optimize drug therapy through generation, integration, and translation of scientific information between the bench and bedside, the patient and the population. DPET advances clinical practice through innovative translational research and through the education and training of clinical scientists, future pharmacists and current practitioners.

DPET is focused on collaborative clinical and translational research projects, with a particular emphasis on developing world-class programs in pharmacogenomics, quantitative pharmacology, and experimental therapeutics.

DPET conducts innovative and clinically relevant translational research that integrates biomedical and pharmaceutical sciences in a laboratory and computer-based environments that leverage preclinical and clinical investigations.

Current research centers around the following therapeutic areas:

- Cardiology
- Hepatology/Gastroenterology/Transplant
- Infectious Disease
- Oncology/Hematology
- Pulmonology

Institute for Drug Safety Sciences



Director
Paul Watkins

Drug Safety: Organ injury, liver, kidney and heart

Integrating clinical medicine with cutting edge systems biology and modeling platforms to make drugs safer:

- In Vitro Platforms
- In Vivo Platforms
- In Silico Modeling
- Post-marketing surveillance

Division: Practice Advancement and Clinical Education

Care Delivery: Clinical education and pharmacy practice

Full-Time Faculty 31

Postdoctoral Fellows 8

Research Funding \$1.7M

Improving healthcare delivery and healthcare outcomes:

- Degree Programs: PharmD and M.S. in Pharmaceutical Sciences
- Continuing Education Training
- Practice Advancement Research
- Practiced Based Scholarship

Practice Advancement and Clinical Education (PACE) supports and advances the practice of pharmacy by providing innovative education and training experiences for pharmacists, both present and future, demonstrating professional leadership, modeling cutting-edge practice and engaging in practiced-based scholarship.

PACE creates, evaluates and disseminates best practices in the optimal use of medications, in the practice of pharmacy, and in the delivery of pharmacy education. Faculty are engaged in research to advance the future of the profession while improving patient-centered, team-based care delivery across a variety of practice settings. Current research studies include:

- Opioids
- Disease state management
- Comprehensive medication management
- Building a sustainable business model
- Precision dosing
- Telehealth services
- Rural health care delivery

Our **Center for Medication Optimization (CMO)** collaborates with the pharmacy practice community, health care providers, patients, payers, policymakers and other key stakeholders to develop and evaluate evidence-based interventions that optimize medications and patient outcomes.

Center for Medication Optimization



Director,
Jon Easter

Pharmacy Practice

Improving healthcare delivery and healthcare outcomes:

- Practice Research
- Strategic Collaborations
- Enhancing Education
- Shaping Health Policy

Division: Pharmaceutical Outcomes and Policies

Patient Outcomes: Therapies, Policies and Practice

Full-Time Faculty 10

Postdoctoral Fellows 4

PhD Students 8

Research Funding \$2.9M

Identify and improve the health outcomes of therapies, policies and practices:

- Pharmacoepidemiology
- Pharmacoeconomics
- Health Services Research
- Implementation Science
- Health Communication & Behavior
- Economics & Policy
- Precision Dosing
- Drug Metabolism and Transport

Pharmaceutical Outcomes and Policies (DPOP) studies the effectiveness and costs of medications, how patients take their medications, and the impact of drug policies on health outcomes of vulnerable people. Research focuses on health outcomes of patients with chronic medical conditions and the roles of pharmacists in medication therapy management.

Faculty have expertise in: pharmacoepidemiology, genomic epidemiology, health behavior and behavior change (including the effects of patient-provider communication, risk communication, and health literacy on health behavior), comparative effectiveness research, pharmaceutical policy, and pharmacoeconomics.

DPOP faculty receive funding through the National Institutes of Health, Agency for Health Care Research and Quality, Centers for Disease Control, Department of Veterans Affairs, and the Patient Centered Outcomes Research Institute as well as a number of private foundations including the Robert Wood Johnson Foundation, the American Cancer Society, the American Lung Association, and industry. Faculty also serve as advisors to the Food and Drug Administration.

DPOP is one of the few programs in the country housed in a school of pharmacy with faculty who have an active research program in pharmaceutical outcomes and policy

DPOP has 12 faculty members and 37 adjunct faculty members.

UNC Research Mission

“Cures and treatments for disease. New technologies. New industries for North Carolina and the world. At Carolina, we tackle tough challenges with multidisciplinary teams of top scientists and students whose diverse perspectives deliver creative, unprecedented solutions. As one of America’s top research universities, we conduct roughly \$1 billion in research annually. We provide dedicated service to our sponsors and unprecedented opportunities for graduate students, postdocs and undergraduates.”

Terry Magnuson

UNC Vice Chancellor for Research

Health Sciences Campus

- Eshelman School of Pharmacy
- School of Medicine
- Gillings School of Global Public Health
- Lineberger Comprehensive Cancer Center
- School of Nursing
- Adams School of Dentistry
- UNC Hospitals

5th

in the U.S. for
federal research among
universities

\$1.1B

in research activity
annually

11th

largest U.S. research
university in volume and
annual expenditures



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