



Going
BEYOND
Excellence



ESHELMAN SCHOOL
OF PHARMACY

2021 Impact Report



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From Our Dean

Our School is composed of a dedicated group of individuals in pursuit of one common goal — solving the world's most pressing health care challenges. Daily, our learners, educators, researchers, alumni and friends are working together to make sure every project, initiative, lecture, and hypothesis begins with a patient in mind. This keeps us grounded and creates a clear vision for the future: pandemic or no pandemic. We are honored to be named #1 in the nation and #6 in the world, and pledge to continue our critical efforts.

This year, we launched our new strategic plan **BEYOND**. Guided by our new mission, vision, and core values, we believe **BEYOND**, will allow us to redefine global excellence in education, pharmacy practice and scholarship. Aligned with our new plan, this year we had great success in the following areas:

Education

- Developed new courses and lecture series for Pharm.D. students in the Business of Healthcare and Data Science
- Launched a new online master's program in health-system pharmacy administration
- Established an education collaboration with Deerfield Management Company to offer an online certificate program called "Molecules to Market," to support the translation of basic research and discovery along the path to commercialization
- Increased completed Pharm.D. applications for the 2020-2021 cycle by 59%

Pharmacy Practice

- Achieved the highest residency match rate in the U.S. among schools with 50+ matching
- Continued to work the front lines of a global pandemic, testing North Carolina residents for COVID-19, and preparing and administering COVID-19 vaccines
- Faculty from the Practice Advancement and Clinical Education Division worked with the North Carolina Association of Pharmacy to develop resources for new law, SL-110-2021, which allows pharmacists to initiate hormonal contraception, glucagon, vaccines, prenatal vitamins, smoking cessation, and post-exposure prophylaxis for HIV via standing order

Scholarship

- Faculty were awarded \$48M in research grants
- Established a first-of-its kind T32 chemistry-focused program to support graduate students preparing for careers in modern biomedical science
- Awarded \$23M from RTI and the North Carolina Legislature to launch READDI (Rapidly Emerging Antiviral Drug Discovery Initiative), a global entity to develop drugs to treat the next pandemic
- Established a CRISPR facility, with a \$2M donation from an alumnus

In addition, we also closed our fundraising campaign a year early, raising nearly \$185 million on an original target goal of \$175 million — the largest amount ever fundraised by a pharmacy school in the United States.

In this Impact Report, you'll see numbers and stories that highlight these achievements. But most importantly, you'll get to know some of the people who made these achievements possible. Take a moment to review all that we have accomplished this year, as we continue our journey together of **Advancing Medicine for Life**.

Angela Kashuba

Dean, UNC Eshelman School of Pharmacy



Our School

Everything we do begins and ends with a patient in mind.

Education

We are reimagining the way students learn

Research

We are discovering innovative solutions to the world's most challenging health problems

Practice Advancement

We are revolutionizing the way pharmacists deliver team-based patient care and improve outcomes

Rankings

#1

Pharmacy School,
U.S. News &
World Report

#2

Among Schools
of Pharmacy in
NIH and Total
Research Funding

#2

Pharmacy and
Toxicology,
U.S. News &
World Report

#4

Best in
Pharmacy and
Pharmaceutical
Sciences 2020,
ShanghaiRanking
Global Rankings

#6

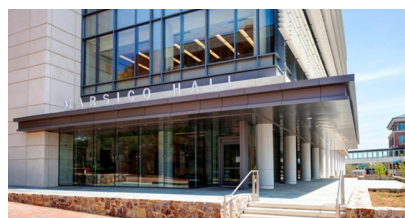
Pharmacy and
Pharmacology,
OS Global
Rankings



Beard Hall



Kerr Hall



Marsico Hall



Genetics and Molecular
Biology Building



Karpen Hall

Our Vision, Mission and Values



Our Vision

To be the global leader in pharmacy and pharmaceutical sciences

Our Mission

Preparing leaders and innovators to solve the world's most pressing health care challenges

Our Values

WE CARE

Welcoming
Equity
Commitment
Accountability
Respect
Excellence

BEYOND Strategic Plan

Guided by our Vision, Mission and Values, we believe our new three-year strategic plan will take us **BEYOND** where we are today and redefine excellence in education, pharmacy practice and research. Our holistic strategic planning process included faculty, staff, students, alumni and friends of the School and yielded three strategic priorities over the next three years.

Strategic Priorities

#1 Create the most engaging culture

- Foster Diversity, Equity & Inclusion
- Improve Well-being & Resiliency
- Expand Engagement

#2 Accelerate innovation and transformational change in pharmacy and the pharmaceutical sciences

- Prioritize Research & Translation
- Develop Educational Offerings
- Advance Practice

#3 Improve operating efficiency to invest in strategic areas

- Optimize Cost/Expense Levers
- Drive New Revenue Generation
- Enhance Facilities and Physical Space



BEYOND

Rankings

Borders

Classrooms

Labs

Excellence

Education Programs

We are preparing the next generation of pharmacists, scientists and education leaders to care for patients and discover innovative solutions to the world's most challenging health care issues.

Pharm.D. Programs

- Pharm.D. Degree
- Pharm.D./MBA Degree
- Pharm.D./MPH Degree

MS in Health-Systems Pharmacy Administration

- Residential Program
- Online Program

Ph.D. in Pharmaceutical Sciences

- Drug Discovery: Chemical Biology and Medicinal Chemistry
- Drug Delivery: Pharmacoengineering and Molecular Pharmaceutics
- Drug Optimization: Pharmacotherapy and Experimental Therapeutics
- Patient Outcomes: Pharmaceutical Outcomes and Policy

Postdoctoral Fellowships

- NIH-sponsored
- Industry-sponsored
- Innovation and Entrepreneurship
- Global Engagement
- Center for Innovative Pharmacy Education and Research

Residency Programs

- Community Pharmacy
- Independent Pharmacy

572

Professional
Students

145

Graduate
Students

123

Full-time
Faculty

193

Staff

93

Postdoctoral
Fellows

2

Campuses



Pharm.D. Program

We are preparing the next generation of pharmacists to be patient care leaders and innovators in a wide range of practice settings.

School's Office of Experiential Programs Receives National Recognition from AACP

The School's Office of Experiential Programs recently received the American Association of Colleges of Pharmacy's (AACP) Award of Excellence in Experiential Education.

The national award is presented annually to one deserving individual or group of individuals for their outstanding contribution to the world of experiential education. This year, the Experiential Education Section Awards Committee, with support from AACP, decided to recognize all members of Experiential Education Departments at each pharmacy institution for their tremendous efforts in keeping programs operational despite pandemic-related challenges.

"The efforts to alter experiential curricula, identify alternate rotations, support students in an ever changing environment, develop and implement workflows for COVID-19 exposure and symptom management, adjust to new site onboarding requirements, and develop our preceptors to support remote learning all while maintaining baseline workflows is



Photo by Jenna Miller

Members of the Office of Experiential Programs, (from left) Kathryn Fuller, Pharm.D.; Abbey Kruse, MEd; Nicki Reitter, Pharm.D., MS; Billy Justus MS; and Christy Holland, Pharm.D.

incredible," said Nicki Reitter, Pharm.D., M.S., assistant dean of Experiential Programs at the School. "This award recognizes and exemplifies the work of our experiential programs team at the School along with regional/site leadership across the state, over 300 experiential sites and more than 1,000 preceptors."

Early Hands-on Training Gives Eshelman Students an Edge

Students complete more than 50% of the curriculum in real-world pharmacy settings, which amounts to 2,400 hours of experiential learning. This is nearly 700 hours more than the Accreditation Council for Pharmacy Education requires.

The UNC Eshelman School of Pharmacy's Office of Experiential Programs aims to design and deliver innovative practice experiences complemented by contextual learning that results in the development of exemplary graduates ready to provide high-quality, team-based, patient-centered care.

Throughout the pandemic, Reitter said the School's experiential team, as well as regional site leadership, worked around the clock to ensure completion of experiential hours so students could graduate on time.

Eshelman Students Help Give First COVID Vaccines in Chapel Hill, Hillsborough



Photo by Brian Strickland

The first dose of the COVID-19 vaccine being administered by UNC Eshelman School of Pharmacy Master's degree-seeking student Charlie Summerlin (above right) to Loc Culp, Medical Intensive Care Unit clinical manager at the UNC Medical Center in Chapel Hill, N.C. on Dec. 15, 2020.

The Eshelman Advantage combines classroom learning and extensive hands-on immersion experiences to ensure our student pharmacists acquire the skills and knowledge they need to be successful in today's increasingly complex health care environment.

This experience was heightened as the COVID-19 pandemic continued to plague communities around the world. Six UNC Eshelman School of Pharmacy learners took part in a historic day, preparing and administering the first doses of the COVID-19 vaccine in Chapel Hill and Hillsborough. Throughout the year, Pharm.D. students on the School's Chapel Hill and Asheville campuses worked the front lines of the pandemic to perform COVID-19 tests and prepare and administer vaccinations.

From January to March, 117 students from the School's two campuses contributed a total of 4,230 volunteer hours and administered and/or prepared 59,200 doses of the COVID-19 vaccine.

Pharm.D. program by the numbers

154

Graduates,
Class of 2021

#1

Residency Match
Rate among
schools with 50+
matching

88%

Received 1st
or 2nd choice
position upon
graduation

98%

NAPLEX First-
Time Pass Rate

59%

Increase in Completed
Applications,
2020-2021 cycle

Ph.D. and Postdoctoral Programs

The Ph.D. and postdoctoral programs prepare tomorrow's scientists for basic, translational, or health outcomes research careers in industry, government or academia.

Ph.D. Program

Drug Discovery

Chemical Biology and Medicinal Chemistry

Drug Delivery

Pharmacoengineering and Molecular Pharmaceutics

Drug Optimization

Pharmacotherapy and Experimental Therapeutics

Patient Outcomes

Pharmaceutical Outcomes and Policy

Ph.D. Student Spotlight

Ph.D. candidate **Daisy Zhu, Pharm.D.**, received a \$20,000 P.E.O. Scholar Award for the 2021-2022 academic year.

The P.E.O. Scholar Awards program was established in 1991 to provide substantial merit-based awards for women of the United States and Canada who are pursuing a doctoral level degree at an accredited college or university. Zhu was one of the 100 women out of 847 nominees selected to receive this year's prestigious award.

"I am incredibly humbled to receive the P.E.O. Scholar Award," Zhu said. "I am excited to join this wonderful community that advocates for women in science."



Daisy Zhu

Postdoctoral Program

Jo E. Rodgers, Pharm.D.

Inaugural Director of Postdoctoral Programs



Industry Postdoctoral Fellowships

- Clinical Research and Drug Development
- Medical Affairs
- Global Drug Safety/Pharmacovigilance
- Pharmacokinetics/Pharmacodynamics/Pharmacometrics
- Global Regulatory Affairs
- Pharmaceutical Outcomes, Market Access and Health Informatics

NIH Postdoctoral Fellowships

- UNC-Duke Clinical Pharmacology T32 Postdoctoral Training Program
- Carolina Cancer Nanotechnology T32 Postdoctoral Training Program

For a complete list of postdoctoral fellowships, visit pharmacy.edu/education/fellowships

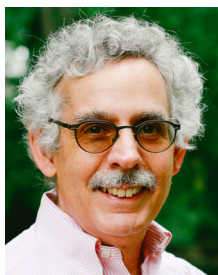
Eshelman Partners With UNC Chemistry for First-of-its-kind T32 Training Program

UNC Chemistry – Biology Interface Training Program

The UNC Eshelman School of Pharmacy joined forces with the College of Arts & Sciences' Department of Chemistry to establish a UNC Chemistry – Biology Interface Training Program that will provide a framework for trainees to obtain the breadth of scientific training essential for modern, mechanistically informed chemical biology.

The T32 CBI Training Program will enable the transformation of outstanding graduate students into independent, skilled, and creative chemical biologists through a combination of didactic coursework, dedicated training opportunities, and research support.

The chemistry-focused T32 program – the first of its kind at UNC – welcomed four Ph.D. candidates into its inaugural class: Jessica Umana, Peter Dykeman-Bermingham, Caylie McGlade, and Meghan Ricciardi. The program is co-directed by Jeff Aubé, Ph.D., distinguished professor in the School's Division of Chemical Biology and Medicinal Chemistry, and Marcey Waters, Glen H. Elder, Jr. Distinguished Professor in UNC's Department of Chemistry.



"Researchers at the University of North Carolina at Chapel Hill currently lead programs that span the chemical-biology interface, ranging from fundamental protein science and analytical aspects of biological systems to synthetic medicinal chemistry and translational drug discovery. It only makes sense that we partner these world-class researchers with the next generation of great scientists,"

Jeff Aubé, Ph.D.

Distinguished Professor,
Department of Chemical Biology and Medicinal Chemistry



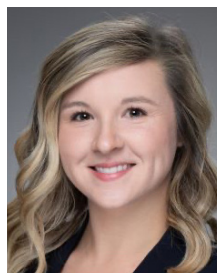
"I hope to increase my understanding of synthetic and medicinal chemistry. Doing so will improve my ability to understand what is happening on a chemical level when using biology and chemistry to develop biological therapeutics in the future,"

Jessica Umana
Ph.D. candidate

M.S. Programs

At the UNC Eshelman School of Pharmacy, our residential Master's degree and newly launched online Master's degree programs prepare future health care leaders to manage highly complex and multi-faceted pharmacy enterprise operations. Meet two of our current students:

"My favorite component of the MS program is the opportunity to work with a diverse group of current and future leaders who are paving the way for pharmacy. The MS program offers its students a unique didactic experience to learn and grow from one another."



Alex Hayes-Porter, Pharm.D.
Current student in the residential master's program (Class of '22)

"I had been considering a master's degree for some time but was concerned about balancing work, school and family life. I had recently completed the ASHP Leadership Academy and was encouraged to pursue a formal degree. This online program appealed to me because it was pharmacy-focused, giving me an opportunity to layer projects for work and school."



Rebekah Matthews, Pharm.D.
Current student in the online master's program (Class of '22)

Learn more about our online and residential master's programs:



2

Programs

50

Students
currently enrolled

8

Partners

100%

Students Placed

Online and On Demand

Deerfield Management, Eshelman Announce First Educational Collaboration

Molecules to Market

The UNC Eshelman School of Pharmacy and Deerfield Management Company (Deerfield) are collaborating to offer a new certificate program called “Molecules to Market.” The online certificate program is specifically designed to support the translation of basic research and discovery along the path to commercialization and will be taught by UNC Eshelman School of Pharmacy faculty and industry experts from Deerfield.

The joint venture kicked off with an introductory seminar held in the spring.

“This type of educational-based collaboration is a new development for Deerfield as we continue to innovate and find new ways to advance healthcare,” said James E. Flynn, managing partner at Deerfield. “With this seminar and future certificate, we aim to leverage key learnings and analysis from previous case studies to highlight the steps required to translate a basic discovery to a medicine that will improve patients’ lives. To reach commercialization, the business plan is



as important as the science itself, and we hope to educate those in the healthcare community and begin to address that gap.”

The program is designed for anyone with an understanding of basic science and a desire to understand both the industry and academic side of translating a discovery for patient benefit. It aims to create a solution for entrepreneurs, leaders and scientists by creating a deep roster of professionals that understand how to move research through the long

process to commercialization.

“Pharmaceutical and biomedical Ph.D. scientists are increasingly involved in all aspects of drug development, but Ph.D. training is almost exclusively focused on technical skills associated with bench science. Our collaboration with Deerfield will fill a much-needed gap by training on specific competencies required to advance discoveries to the market,” said Angela Kashuba, dean of the UNC Eshelman School of Pharmacy.

Shaping Global Leaders in Pharmacy

Eshelman Alum Establishes First ASHP-Accredited International Pharmacy Residency Program

UNC Eshelman School of Pharmacy alumni Imad Treish, Pharm.D., Chief Strategy Officer at King Hussein Cancer Center (KHCC) in Amman, Jordan, helped establish the first international pharmacy residency program accredited by the American Society of Health-System Pharmacists (ASHP).

Treish completed his Doctor of Pharmacy degree with the UNC Eshelman School of Pharmacy in 1999, and a residency in Hematology/Oncology at UNC Hospitals in 2000. Today, he works to better pharmacy practice around the world.

When Treish started at KHCC in 2002 as founding chairman for the department of pharmacy, he said he faced many challenges, including the lack of trained hospital pharmacists, severe shortages of medicines, and spiraling costs of new cancer drugs, on top of working in a foreign country that he'd never been to and in a medical environment that seemed skeptical of pharmacists.

Over the years, Treish worked to reshape the role of pharmacists within the hospital by creating the region's first center for drug policy and evaluation that implemented

pharmacoeconomic evaluation for new cancer drugs based on local metrics to ensure that only cost-effective drugs would be added to the formulary. Through his efforts, he was able to develop a world-class department of pharmacy modeled after UNC Hospital's Pharmacy Department.

"I was fortunate to have great mentors at UNC who advised me on how to build the pharmacy program at KHCC and had great help from the pharmacy leadership at the National Institutes of Health. Most importantly, I had the trust and support of the senior leadership at KHCC to enable me to take pharmacy practice to new levels not experienced in Jordan before," Treish said. "The UNC Eshelman School of Pharmacy, its faculty and students can play an important role in helping many developing countries implement advanced practice models that can demonstrate the value that pharmacists can add to patient care and to healthcare systems in their countries."

Treish has since worked with various investment funds in the region to plan and build healthcare projects in other



Imad Treish, Pharm.D.

parts of the world including India, Pakistan, Kenya, Nigeria, Armenia, Jordan, and Palestine.

"Exploring potential partnerships with local and international organizations is another amazing component of what I do. But the most exciting part of my day is visiting patient care areas whether inpatient or outpatient and interacting with our staffs and patients. Feeling the genuine appreciation in the eyes and words of staffs and patients, reinforces my conviction that we are doing good," he adds.



Student and School Recognition

Student Awards and Recognition

Aliyah Cruz, Pharm.D. candidate, elected as president of the Student National Pharmaceutical Association

Yien Liao, Ph.D. candidate, earned the Ministry of Education of Taiwan Fellowship

UNC Student National Pharmaceutical Association Chapter takes home top awards at virtual national convention:

- First place in the first annual “SNPhA Great Debate” **Galina Wang and Lee Arphai**
- Third place in the “Prescription for Service” Award: Steady Forward for Steadfast (Asheville Campus), which included **Galina Wang, Lee Arphai, Morgan Phillips and Amanda Myers**
- Best Overall in the “Scrapbook Competition”: **Hawi Tassisa**
- SNPhA Scholarship Winners: **Aliyah Cruz, Jasmine Perry, Megan Griffin, Lee Arphai and Ashley Gleaton**
- UNC-SNPhA was also nominated for multiple awards including Chapter of the Year 2019-2020 and National JB Hill President of the Year **Julie Shiyayo**
- **Esha Thakkar and Megan Griffin, Pharm.D. candidates**, won second place in the National SNPhA Regional Conference Clinical Skills Competition

Alice Cheng, Pharm.D. candidate, received the best student poster at AMCP Foundation Semiannual Best Poster Competition

Jennifer Schweiger and Katelynn Granger, Pharm.D. candidates, awarded second place in

the ASHP Clinical Skills Competition

Zoey Tang, M.S., received the School’s Kathryn A. Brewington Graduate Research Award

Natalie Jasiewicz, Ph.D. student, awarded the Pharmaceutical Research and Manufacturers of America Foundation’s Predoctoral Fellowship in Drug Delivery

Neel Swamy, Pharm.D./MPH candidate, elected president of The Graduate and Professional Student Federation at UNC, first pharmacy student to hold the position

Lida Ghazanfari, Ph.D., postdoctoral student, received an EII Rankin Innovator Acceleration Award

Cami Lynn Andreini, Leah Dawn Baker, Emily Howe Barbour, Amanda Leigh Brademeyer, Catherine E. Donnell, Robyn Elizabeth Dryer, Stephen Michael Robert Duncan, Kendra Louise Gee, Suzan Gomes, Jeffrey Michael Harrington, Kaley Joy Hart, Aimee Ho, Courtney Paige Jackson, Kyle Christopher Jansen, McKenzie Finch Jones, Rebecca Lynn Kielminski, Daria Elizabeth Kavasckitz, Anna Li, Katie O’Malley Marks, Ashton Brooke O’Hara, SiTong Shu, Justin David Durant Southern, Sydney Caroline Stocks, Jacob Paul Stroud, Justin Andrew Suero, Esha Thakkar, Brandyn Charles Wilcox, Marshall Dean Winget, Stephanina Jia Zhang, and Stephanie Zhang, were inducted into the Rho Chi Pharmacy Honor Society

Christopher Parish, Pharm.D. candidate, created the Pharmacy Student Leaders Network

Aimee Ho, Yue (Alyssa) Yin, Taysir Chamem, Sarah Gorban, Sherry Xia, Hannah Newkirk,

Anna Li, Sun Bae, Elaine Kim, Gail Kheyman, Hannah Feinman, Alana Bergeron, Layna Perini, Grace Liu, Isabel Cheng, Truc Pham, Emma Meyer, Patricia Huang, Megan Griffin, Katie Brandecker, Tatiana Hines, Snow Yang, Marissa Ross, Jisun Ban, Caroline Todd, Catherine Liu, Megan Tran, Kelsey Chaykowski, William Burks, Helen Kim, Jasmine Johnson, Noelia Goti, Mori Crocker, Luke Wheelless, Jordan Sun and Sophia Nies, won first place in the 2020-21 Value of Industry Pharmacists Case Competition

Isabella Young, Ph.D. candidate, earned the prestigious National Science Foundation predoctoral fellowship; IAS/MSD Prize for Research in HIV Prevention

Samantha Ottavi, Ph.D. candidate, selected as an American Chemical Society (ACS) Division of Medicinal Chemistry fellow

Ava Vargason, Ph.D. candidate, won third place for the Trainee Video for Controlled Release Society Focus Group - Transdermal and Mucosal Delivery; received the Feng Liu Award; and won first place in The Graduate School’s Three Minute Thesis Competition

Sara Musetti, Ph.D., and Emily Bonacquisti, Ph.D. student, received the AAPS Best Abstract Award

Alison Mercer-Smith, Ph.D. candidate, received the Scott Neil Schwirck Fellowship; UNC Horizon Award; 2021 Gertrude B. Elion Mentored Medical Student Research Award from Burroughs Wellcome Fund and Triangle Community Foundation

Kunyu Qiu, Ph.D. candidate, selected as the MIT Microbiome Club poster session winner

Lilyan Mather, Ph.D. candidate, received an Eshelman Fellowship

Benjamin Strickland, Ph.D. candidate, received a CBMC Merit Award

James Wellnitz, Ph.D. candidate, received an Eshelman Fellowship

Spinel Karas, Ph.D. candidate, received a GlaxoSmithKline Fellowship (1-year award), and UNC-Duke Collaborative Clinical Pharmacology T32 Postdoctoral Training Fellowship

Jiawei Zhou, Ph.D. candidate, received a GlaxoSmithKline Fellowship

Nicole Lukesh, Ph.D. candidate, received an Eshelman Fellowship

Lexy Ehlert, Ph.D. candidate, received an Eshelman Fellowship

Ph.D. students, **Daisy Zhu, Pharm.D.**, **Aaron Devanathan, Pharm.D.**, and **Patricia Maglalang, Pharm.D.**, received an American Foundation of Pharmaceutical Education Fellowship

Jordan Joiner, Isabella Young, Rebecca Johnson, and **Ava Vargason** received National Science Foundation Graduate Research Fellowships

Rachel Parry, Pharm.D., received a R36

dissertation award from The Agency for Healthcare Research and Quality

Billy Murphy, Pharm.D., received a Certara Simcyp Division Grant and Partnership Scheme award

Rebeca Stiepel received a Ford Foundation Predoctoral Fellowship

Patty Maglalang, Ph.D. candidate, named an AFPE Phi Lambda Sigma First Year Graduate Research Fellow

School Awards and Recognition

Launched the **Bizzell Business of Health Care Pharmacy Lecture Series**, founded by generous Carolina alums W. Robert (Rob) Bizzell BSPHAR, ('76) and Suzanne Bizzell BSP ('77)

Led by **Betsy Sleath, Ph.D.**, school offered new undergraduate course this fall titled, Pharmaceuticals: Ethical and Social Issues

School established **assured admissions programs** with Appalachian State University and the University of North Carolina Wilmington

Betsy Sleath, Ph.D., named Regional Associate Dean of Eastern North Carolina:

"I love Eastern North Carolina and the partners I have worked with over the years are phenomenal. We continue to do important work together on improving adolescent health and I am thrilled to have the opportunity to help the School build additional partnerships in research, teaching, and service in the region," Sleath said.



Betsy Sleath

Sam Lai, Ph.D.; Jon Easter; Tim Willson, Ph.D.; and Ken Pearce, Ph.D., received a combined \$1.2 million from the NC Policy Collaboratory to combat COVID-19

More than 350 gathered for virtual Innovations and Transformations in Pharmaceutical Sciences 2020 Conference

Stephen Eckel, Pharm.D., MHA; Stephen Frye, Ph.D.; Leaf Huang, Ph.D.; Dimitri Kireev, Ph.D.; Juan Li, Ph.D.; Qi Long Lu, Ph.D.; Brian Roth, M.D., Ph.D.; Mark Schoenfisch, Ph.D.; Xiaodong Wang, Ph.D.; Xiao Xiao, Ph.D.; Bing Yang, M.S., featured at 2020 Celebration of Inventorship event

Led by **Alexander Kabanov, Ph.D., Dr.Sci.**, Carolina Nanoformulation Workshop, Nanomedicine Drug Delivery Symposium tops 800 virtual participants, largest turnout in 18 years

Led by **Caroline Sasser, Pharm.D., David Steeb, Pharm.D., MPH, and Laura Bratch**, first month-long PharmAlliance virtual meeting tops 800 global participants



The 2nd Annual Harold and Carol Kohn Distinguished Alumni Lecture was held Nov. 5, 2021, at the Carolina Inn as part of Pharmacy Alumni Weekend and featured Lisa D. Carlton, MS, Ph.D., graduate of the class of '95. Carlton is currently Vice President of Global Regulatory Affairs at REGENXBIO Inc., a biotechnology company focused on gene therapy product development.

Research Enterprise

Our researchers and scientists are working on the world's most challenging health issues ranging from cancer and cardiovascular disease to neurological disorders and medication management. Our dynamic and highly collaborative Research Enterprise spans the entire drug development and delivery lifecycle.

Researcher Spotlights:

Erin Heinzen awarded two grants totaling \$7 million to identify, study genetic variants that cause epilepsy

Erin Heinzen, Pharm.D., Ph.D. recently received two collaborative R01 grants totaling \$7 million from the National Institute of Neurological Disorders and Stroke to identify and study epilepsy-causing genetic variants that arise during brain development.

One grant focuses on identifying genetic variants that are responsible for seizures by studying the brain tissue of individuals with epilepsy who undergo surgery to treat persistent seizures. The second focuses on studying the effects of SLC35A2 variants (discovered by Dr. Heinzen's lab in 2018) on brain development and activity using human neurons derived from induced pluripotent stem cells.



Erin Heinzen

Sam Lai awarded grants to advance antibodies for non-hormonal contraceptives

Sam Lai, Ph.D., received two separate R01 awards from the National Institutes of Health totaling \$3.5M to develop antibodies for non-hormonal contraception.

The first project seeks to develop bispecific antibodies that can reduce sperm motility through mucus by both binding multiple sperm together as well as turning off the biological machinery that allow sperm flagella to beat and propel itself through mucus.

The second project, part of a larger \$3.5 million initiative with Oak Crest Institute of Science, seeks to create a "smart" integrated intravaginal ring that can provide non-hormonal contraception, HIV prevention, and monitoring of the ring usage.



Sam Lai

\$48M

Research Grants

#2

Total Research Funding

#2

NIH Funding

21

New Invention Disclosures

11

U.S. Patents Issued

Research Awards and Recognition

Grant Spotlights

Stephen Frye, CBMC

NIH: Open Drug Discovery Center for Alzheimer's Disease
\$1,946,180

Gauri Rao, DPET

DOD: Novel Antimicrobial Hybrid Hydrogel Dressing Targeting Wound Infections Caused by Superbugs Resistant to All Current Antibiotics
\$1,057,527

Kristy Ainslie, DPMP

NIH: Host Targeted Therapy for Drug Resistant Salmonella and Francisella Infection
\$1,043,412

Xiao Xiao, DPMP

Industry: Ask Bio-Xiao Lab Research Agreement
\$1,008,649

Angela Kashuba, DPET

NIH: Novel Mass Spectrometry Imaging Methods to Quantify Antiretroviral Adherence
\$958,259

David Drewry, CBMC

Non-Profit: Developing a Structure-Guided Drug Discovery Pipeline for Direct Brachyury Inhibition-Phase 2
\$911,287

Alexander Tropsha, CBMC

NIH: ARAGORN: Autonomous Relay Agent for Generation of Ranked Networks
\$900,405

Lindsey James, CBMC

NIH: Polycomb Repressive Complexes as Key Regulators of HIV and Targets for Latency Reversal
\$890,017

Sam Lai, DPMP

Non-Profit: Preclinical Development of a Potent Muco-Trapping Antibody Against SARS-COV-2 for Inhaled Immunotherapy and Prophylaxis Against COVID-19
\$798,352

Stefanie Ferreri, PACE

NIH: Implementation of a De-prescribing Medication Protocol to Evaluate Falls in Older Adults
\$750,000

Celebration of Inventorship

Stephen Eckel, Pharm.D., MHA, Patent No. 10,240,959 - Devices, systems, and methods for volumetrically measuring syringe fluid

Stephen Frye, Ph.D., Patent No. 10,179,133 - Pyrrolopyrimidine compounds for the treatment of cancer

Dimitri Kireev, Ph.D., Patent No. 10,179,133 - Pyrrolopyrimidine compounds for the treatment of cancer

Xiaodong Wang, Ph.D., Patent No. 10,179,133 - Pyrrolopyrimidine compounds for the treatment of cancer

Leaf Huang, Ph.D., Patent No. 10,426,745 - Polymeric metformin and its use as a therapeutic agent and as a delivery vehicle

Juan Li, Ph.D., Patent No. 10,308,705 - Optimized human clotting factor VIII gene expression cassettes and their use

Qi Long Lu, Ph.D., Patent No. 10,350,305 - Compositions for treating dystroglycanopathy disorders

Bryan Roth, MD, Ph.D., Patent No. 10,301,630 - Methods and compositions for unsilencing imprinted genes

Mark Schoenfisch, Ph.D.

- Patent No. 10,196,349 - Tunable nitric oxide-releasing macromolecules having multiple nitric oxide donor structures
- Patent No. 10,435,357 - Tunable nitric oxide-releasing macromolecules having multiple nitric oxide donor structures

Xiao Xiao, Ph.D.

- Patent No. 10,308,705 - Optimized human clotting factor VIII gene expression cassettes and their use
- Patent No. 10,350,305 - Compositions for treating dystroglycanopathy disorders

Practice Advancement

We are working across the continuum of care to optimize medication use for patients, improve patient outcomes and transform the role of pharmacists in providing patient-centered team-based care.

ASHP honors UNC team with 2021 Best Practices Award

The American Society of Health-System Pharmacy (ASHP) has once again recognized the UNC Eshelman School of Pharmacy/UNC Health Care team with the ASHP Best Practices Award. The team's awarded program, titled "Pharmacist-Led Program Leads to Safe and Efficient Outpatient Initiation of AML Venetoclax-Based Regimen," was led by Katie Buhlinger, Pharm.D., BCOP, CPP, Oncology Clinical Pharmacist Practitioner with the NC Cancer Hospital Adult Leukemia Clinic, and alumna of the UNC Eshelman School of Pharmacy. The team's program sought to safely initiate an outpatient setting for Venetoclax therapy – a medication often given to patients battling leukemia – that would have otherwise required inpatient care. There were 47 patients treated with only one case of tumor lysis syndrome, and 83% of patients were able to remain outpatient for their first week of therapy.



Front row (from left): Udobi Campbell, Pharm.D., MBA; Benyam Muluneh, Pharm.D., BCOP, CPP; and Katie Buhlinger, Pharm.D., BCOP, CPP. **Back row:** Suzanne Francart, Pharm.D., BCPS (left); John Valgus, Pharm.D., MHA, BCOP; Maurice Alexander, Pharm.D., BCOP, CPP; Jeffrey Reichard, Pharm.D., MS, BCOP; and Stephanie Jean, Pharm.D., MS, BCPS.

The UNC Medication Assistance Program and UNC Specialty Pharmacy were vital partners of this program, preventing delays in initiating therapy and minimizing out-of-pocket expenses for the patients.

UNC Eshelman School of Pharmacy helps shape new legislation

Faculty from the Practice Advancement and Clinical Education Division worked with the Executive Director at the North Carolina Association of Pharmacy to develop resources for pharmacy legislation that was proposed this year. Faculty also drafted proposed standing orders for consideration by the North Carolina Department of Health and Human Services and State Health Director Dr. Betsey Tilson now that the legislation passed into law. The new law, SL-110-2021, allows pharmacists to initiate hormonal contraception, glucagon, vaccines, prenatal vitamins, smoking cessation, and post-exposure prophylaxis for HIV via standing order. The passed legislation was supported by key external partners that will enhance future collaborative efforts between pharmacy and providers.

Advancing pharmacy practice in North Carolina and **BEYOND**

As part of the School's new strategic plan, **BEYOND**, the School will focus on accelerating innovation and transformational change in pharmacy and the pharmaceutical sciences. A priority objective includes advancing pharmacy practice using the following initiatives:

Objective 3

Advance Practice

Initiatives

- Transform the business model for pharmacy services in North Carolina
- Advance the delivery and quality of patient care in community pharmacy and ambulatory care across North Carolina

Team works to improve patient care in Western North Carolina

The UNC Eshelman School of Pharmacy in partnership with the Alliance for Integrated Medication Management was awarded a \$399,175 grant from the Dogwood Health Trust to improve patient care, optimize medication use and access, and better chronic care management for individuals in Western North Carolina.

The project, titled "Patient-Centered Needs Assessment to Optimize Medication Use and Chronic Care Management in Western North Carolina: Building Upon Learnings from WNC Healthy Impact," is led by Stephanie Kiser, BSPHarm, Director of Rural Health at the UNC Eshelman School of Pharmacy, and includes team members Mary McClurg, Pharm.D., M.H.S., Executive Vice Dean-Chief

Academic Officer; and Mollie Scott, Pharm.D., Regional Associate Dean of the School's Asheville Campus.

The grant will provide support for the team to perform a targeted needs assessment across several predominantly rural counties in WNC. The team plans to utilize findings to establish defining features of coordinated care delivery systems needed in the region to serve under insured/uninsured patients with complex medication plans and chronic health conditions.



Stephanie Kiser

Strengthening Primary Care in the United States

Vice Dean-Chief Academic Officer Mary McClurg, Pharm.D., M.H.S.,

served as a member of the National Academy of Sciences, Engineering, and Medicine (NASEM) Committee that aimed to strengthen primary care

services in the United States, especially for underserved populations, and to inform primary care systems around the world. The NASEM ad hoc committee recently published a report of their findings titled, "Implementing High-Quality Primary Care," which examines the current state of primary care in the United States.



Mary McClurg

Read the full report



Eshelman Institute for Innovation

The Eshelman Institute for Innovation is forging a game-changing approach to translating bold new ideas into real-world impact for patients. Today, the Institute is enabling scientists to screen for new drug targets and prepare for the next pandemic.

Collaborative CRISPR facility enables genome screening for new drug targets

In 2012, a revolutionary new way to edit genes was unveiled to the world – CRISPR. Since then, the technology has been named as a “Breakthrough of the Year” by Science and has expanded to be applied to targeted epigenome editing. Now, this exciting technology exists at UNC-Chapel Hill to enable rapid whole genome screening for new drug targets in the CRISPR Genetic & Epigenetic Screening Center (CGESC). The state-of-the-art facility positions UNC to become a leader in academic CRISPR screening. The CGESC opened its doors to the UNC community on Oct. 1.

The CGESC, located on the second floor of the Genetic Medicine Building, offers both arrayed screens and pooled whole-genome screens. Both services include screen design, experimental work, and

detailed analysis. While the center is primarily for use by UNC PIs, services will be available to external users, including other universities and biotech companies.

The new facility was made possible by a cross-campus collaboration between the Eshelman Institute for Innovation, the Lineberger Comprehensive Cancer Center, the Eshelman School of Pharmacy, the School of Medicine, and the Office of the Vice Chancellor for Research. In addition, NC Biotech provided a generous equipment grant to help purchase key machinery for the facility.

“I am thrilled to bring a modern genetic and epigenetic screening facility to UNC’s laboratories. The CGESC will enable many future discoveries and fill UNC’s drug discovery teams with new project pipelines,” said CRISPR Facility Director



Photo by Kevin Robinson

Dr. Nate Hathaway (left) walks guests through the new facility in November 2021.

Nate Hathaway.

“With CRISPR, we have the ability to continue to help patients struggling with the world’s most challenging health issues.”

\$28.9M

Grants Awarded
since 2015

148

Projects
Funded

13

Startup
Companies

\$30.7M

Startup Funds
Raised

READDI awarded \$23M in seed funding to produce antiviral drugs for the future

The Rapidly Emerging Antiviral Drug Development Initiative, a collaboration co-founded by UNC-Chapel Hill scientist Nat Moorman, recently received \$18 million from the North Carolina Legislature to produce antiviral drugs to prevent the next pandemic.

The team of scientists will use the seed funding to seek broad-spectrum antiviral medicines that can block many viruses at once.

In addition, RTI International, a nonprofit research institute, announced READDI as the winner of its Forethought Research Collaboration Challenge, awarding the initiative \$5 million.

Forethought, launched earlier this year, sought bold, visionary proposals that would address critical societal issues, specifically in the Research Triangle region.

The challenge received 136 initial applications.



“Support from the RTI Forethought Challenge and North Carolina will let READDI expand existing partnerships and forge new ones that leverage the cutting-edge capabilities of the Triangle to develop the drugs we need to be ready for future

pandemics,” said Moorman, an associate professor of microbiology and immunology at UNC-Chapel Hill.

These new drugs could prevent surges on health care systems and help maintain economic stability.

26

Technologies
Licensed

2

Strategic
Partnerships

193

Pharm.D./Ph.D./Postdocs
Supported and Trained

6

EII Postdoc
Fellows

85

High School
Students

Global Engagement

We are developing citizens of the world who will serve diverse patient populations in a variety of practice settings in local, national, and global communities.



PharmAlliance is a partnership among the pharmacy schools of UNC-Chapel Hill, Monash University, Australia, and UCL UK to address major global challenges in the pharmacy profession and human health care through advancing education, research and pharmacy practice.

75

Publications

74

Presentations

101

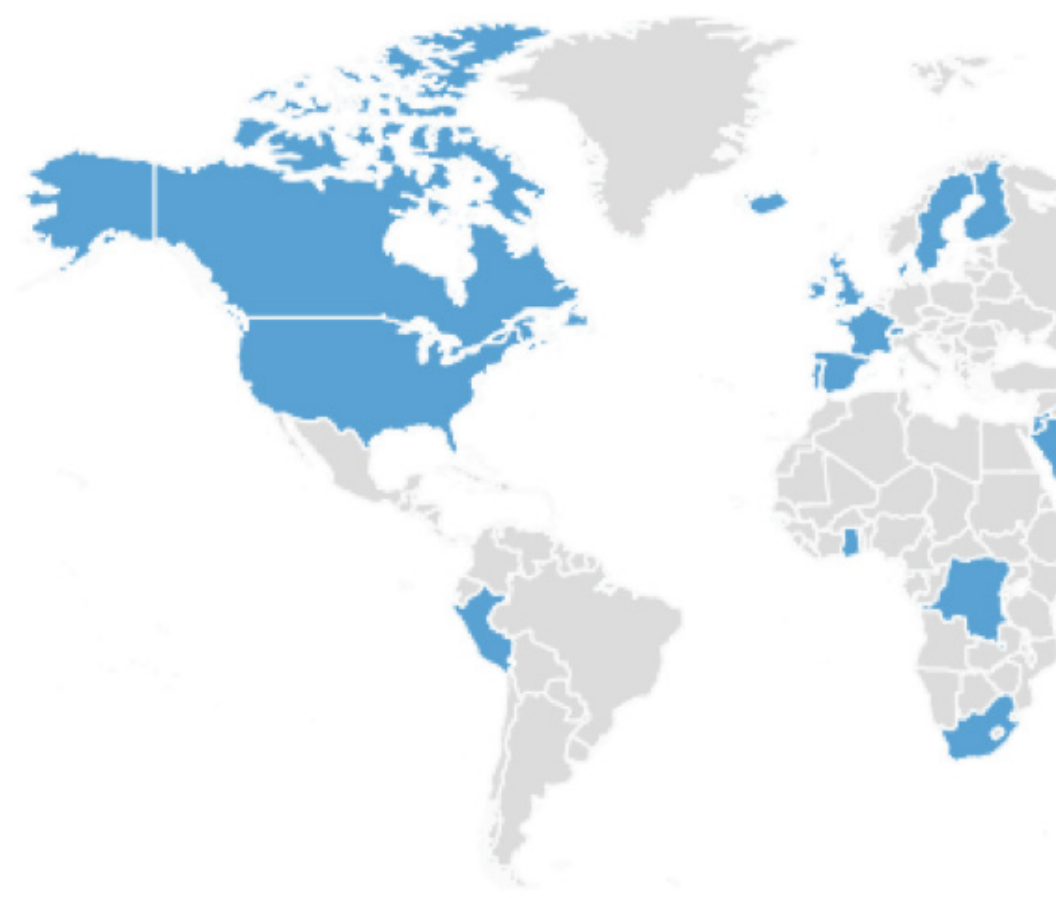
Exchanges

\$1.5M

Startup Companies

800

Attendees during first virtual
PharmAlliance meeting





APLU honors UNC with Platinum Award, features PharmAlliance for advancing international efforts on campus

In recognition of its extraordinary global learning, research, and engagement efforts, the Association of Public and Land-grant Universities (APLU) named the University of North Carolina at Chapel Hill the Platinum winner of its 2021 Institutional Award for Global Learning, Research & Engagement, citing PharmAlliance as a key driver of internationalization on campus.

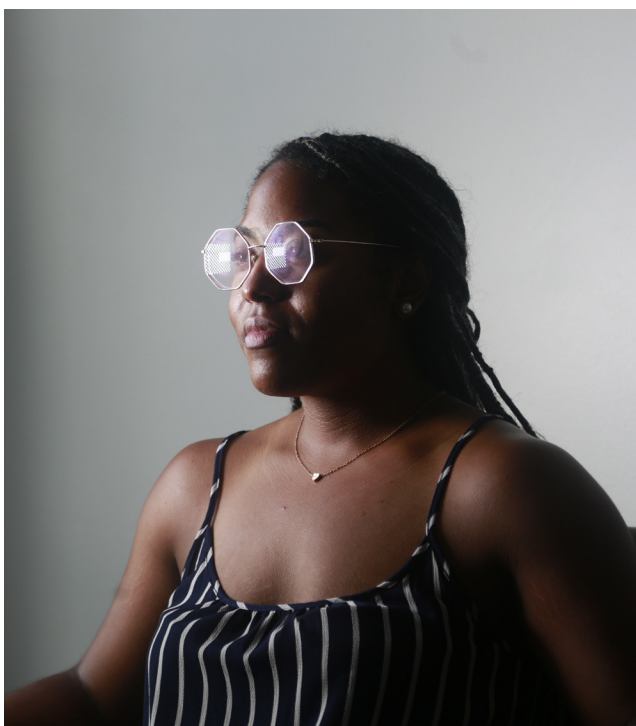
The Platinum Award is APLU's highest-level award granted to a member institution in recognition of inclusive and comprehensive efforts to internationalize its campus. UNC is one of two institutions across the country recognized with the prestigious award.

The PharmAlliance partnership between the UNC Eshelman School of Pharmacy, Monash University in Australia, and University College of London, is highlighted by the APLU for dramatically accelerating gains across research, education, and practice to transform education delivery and address major research challenges — as well as for providing a replicable model for creating highly productive partnerships.

"In our increasingly globally linked world, internationalization of campuses is critically important for the excellence of education, research, and community engagement work," said APLU President Peter McPherson.

Diversity, Equity, and Inclusion

As part of our **BEYOND** strategic plan, we have identified three strategic priorities that are critical to our goal of creating a diverse and inclusive community of people who will accelerate new thinking and ideas in education, research and practice that improve human health worldwide. Year one laid the groundwork for preparing culturally intelligent professionals and building an inclusive environment. All targets were met for the School's three strategic priorities which include:



Strategic Priority 1: Recruit and Retain Diverse Talent

Strategic actions committed to building a diverse workforce

- Partnered with pharmaceutical industry and academia to fund the first Innovation Fellowship
- Collaborated with North Carolina Historically Black Colleges and Universities (HBCUs) and Minority Serving Institutions (MSIs) to conduct virtual tours to better support prospective underrepresented minority (URM) students in their efforts to pursue careers in pharmacy and the pharmaceutical sciences – 174 individuals registered, 83 individuals participated, and seven out of ten NC HBCUs/MSIs engaged
- Created recruitment videos highlighting current professional and graduate students, faculty, and alumni to increase access to experiences and perspectives pertaining to professional development

Read the School's inaugural DEI Impact Report:





Strategic Priority 2: Prepare Culturally Intelligent Professionals

Students rated all Ph.D. and Pharm.D. courses

4.6/5

regarding cultural diversity-related content and inclusivity practices enhancing their learning in Spring 2021

Students rated all Ph.D. and Pharm.D. courses

4.87/5

regarding being treated with respect in Spring 2021

Preceptors and faculty rated the five courses in the DEI Educator Series

4.64/5



Strategic Priority 3: Build an Inclusive Community

11

Presentations on DEI topics given by faculty, staff and students

5

Sessions to support faculty and preceptors to facilitate inclusive learning practices

2

New committees to help guide DEI Strategy

14

Units and divisions held managing bias conversations

10

Faculty and staff funded to attend the AACP Equity, Diversity, and Inclusion Institute

100%

Of School leaders completed Racial Equity Institute Groundwater Training

Exceeding Goals, Making History

To date, the UNC Eshelman School of Pharmacy has raised nearly \$185 million through the generosity of more than 2,300 alumni and friends. This is the largest School of Pharmacy campaign in history and shatters the School's original target goal of \$175 million.

Alumni hope to inspire philanthropy, support next generation of pharmacy students

Alumni Ping and Allen Rogers are incredibly grateful for the UNC Eshelman School of Pharmacy – not only for the education they received, but for the lifetime of friendships and networks fostered by the close-knit pharmacy community within the School.

For more than four years, Ping ('90, BSPharm) and Allen ('90 BSPharm, '03 Pharm.D.) have shown their appreciation through the establishment and continual support of the David A. Rogers, Sr. and Dr. T.Y. Su Memorial Scholarship Fund.

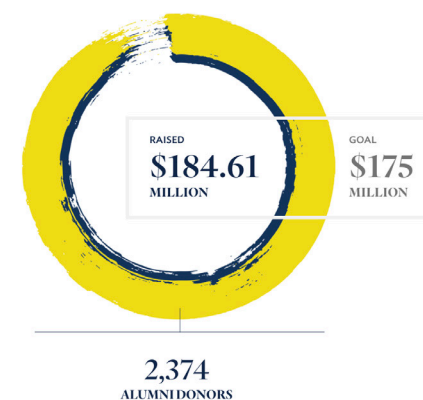
The scholarship supports a first-generation college student each year and honors both Ping's and Allen's fathers. Allen's father served in Vietnam and came home to work in the textile industry with his wife to support their family. Ping's parents immigrated to the United States from Taiwan to further their education, bravely making the move without knowing anyone



Alumni Ping (left) and Allen Rogers.

and having to overcome cultural barriers that were in place in order for their family to succeed, Ping said.

"Our parents sacrificed greatly in order for us to further our education," Ping said. "Now, we've been fortunate enough that we can give back and inspire great students...and I hope we can inspire them to pay it forward."



*Includes historic \$100M gift from alumni donor Fred Eshelman '72 to establish the UNC Eshelman Institute for Innovation

This year's recipient of the scholarship is Pharm.D. student Maggie Fogle.

Fogle says, "I just want to thank you for your very generous support...you have lightened my financial burden so I can focus more on schoolwork and learning. Hopefully 10, 15 years down the road I'll be able to use my success to give back to the next generation of pharmacists, just like you did."





 **UNC** | **ESHELMAN SCHOOL
OF PHARMACY**

Advancing Medicine For Life