MISSION

To advance the pharmacy profession and patient-centered care across Ohio and around the globe through innovative teaching and practice, groundbreaking research, and transformative outreach and engagement.
MESSAGE FROM THE DEAN

It is an enormous understatement to say that the 2019-2020 academic year was unprecedented. Since becoming dean, I have seen how Pharmacy Buckeyes rise to challenges with innovation, accountability and integrity – characteristics that are core to our values. Our faculty, staff and students demonstrated these characteristics and an incredible amount of resiliency as COVID-19 became an unexpected part of our reality. I will never forget how our community stepped up so that our academic mission could continue despite being confined to our homes. It hasn’t been easy, but we are committed to facing the uncertainty ahead of us together.

Our researchers answered the call by applying for – and receiving – grants to develop therapeutics for the novel coronavirus. Our faculty, residents, students and alumni practicing pharmacy in communities across the country developed innovative ways to continue serving their patients safely. Alumni and donors addressed the economic impacts of the pandemic through charitable giving. Across the board, Pharmacy Buckeyes have continued to rise to the challenges presented by our new way of life.

The college’s response to the pandemic is far from the only thing to celebrate from the past year. We received another top 10 placement in the U.S. News and World Report ranking of schools of pharmacy nationwide. Our faculty, staff, students and alumni have joined the Ohio Pharmacists Association to build a taskforce, working to implement provider status in the state – and have made great strides that positively impact all pharmacists and their patients.

I am always impressed by the dedication of our faculty and practitioners who go to great lengths to train future pharmacists and health care leaders; by our students, whose hard work shines in the classroom and in clerkships; and by our researchers who push the boundaries of drug discovery, publishing groundbreaking articles that influence our peers all over the world.

This year we collectively chose to make changes to our division structure – to better nurture our diverse strengths. We expanded from four divisions to five, including three research divisions, a teaching division and a practice division. The new division structure will focus our innovation efforts to drive skill development in our laboratories, clinics and community practices. We will grow our ability to optimize individual and population health and outcomes while advancing the pharmacy profession through innovative, multidisciplinary courses and programs at all levels of learning.

We are committed to assuring that what was a year of immense change for our college will strengthen our institution. I am proud of our accomplishments, and hope you enjoy reading about just a few of them in the pages ahead.

Best wishes,

Henry J. Mann, PharmD, FCCP, FCCM, FASHP
Dean and professor, College of Pharmacy
The Ohio State University
The Ohio State College of Pharmacy ranks first in the state and seventh in the nation among all schools of pharmacy according to U.S. News & World Report. This latest ranking, which was released in March 2020, continues the college’s more than a decade-long trend as a top 10-ranked program.

“We consistently strive for excellence and to provide a quality education for our future pharmacists. I am proud of this ranking and to be recognized for the work we are doing here,” said College of Pharmacy dean Henry J. Mann, PharmD, FCCP, FCCM, FASHP.

Since the last ranking in 2016, the College of Pharmacy implemented an innovative Doctor of Pharmacy curriculum; upgraded its physical spaces by renovating its Integrated Patient Care Laboratory and numerous research laboratories; and over the last four years, has recorded the highest NIH funding and total research funding in the history of the college.
The college’s outreach has also fueled exciting initiatives. In 2017, Ohio State received the Lawrence C. Weaver Transformative Community Service Award by the American Association of Colleges of Pharmacy (AACP). This accolade is presented annually to one college or school of pharmacy demonstrating a major institutional commitment to addressing unmet community needs through education, practice and research. The college’s Generation Rx prescription drug misuse program, the Partner for Promotion program and corporate partnerships with local pharmacies have all helped the college affect change throughout the profession of pharmacy.

“We have recently updated the college’s strategic plan and announced our next campaign,” Dean Mann said. “These initiatives will continue to propel the college forward and provide a roadmap for stronger partnerships spanning both clinical practice and research endeavors. Ultimately, they will help us fulfill our mission of advancing the pharmacy profession and patient-centered care across Ohio and around the globe through innovative teaching and practice, groundbreaking research, and transformative outreach and engagement.”

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**THE COLLEGE OF PHARMACY’S ONGOING FIGHT AGAINST COVID-19**

As the COVID-19 pandemic swept Ohio, College of Pharmacy faculty, staff and students sprung into action to accommodate distance learning and research treatments for the novel coronavirus while continuing to provide excellent patient-centered care in the community.

**COP researcher receives university funding for COVID-19 early detection project**

The Ohio State University’s Office of Research awarded more than $770,000 of funding to 24 projects aiming to boost research in response to the COVID-19 pandemic. Dan Shu, PhD, research associate professor in the Division of Pharmaceutics and Pharmacology, was chosen to receive funding for her project, "Rapid, simple, and low-cost for early diagnosis of COVID-19 by nuclei acid probes on nitrocellulose membrane without the need of other equipment."

Through this research, Dr. Shu is working to develop a rapid, convenient and low-cost alternative for the early diagnosis of COVID-19 through the detection of the SARS-CoV-2 antigen.

**College of Pharmacy adapts to COVID-19 while continuing care at practice sites**

The emergence of COVID-19 has put a spotlight on pharmacists and other health care workers fighting to stave off the spread of infection and treat patients. Community pharmacies, hospitals and clinics have adapted their practices to conform to social distancing restrictions and take proper precautions in order to keep treating patients safely. For College of Pharmacy faculty, staff members and residents involved in pharmacy practice, COVID-19 has presented unprecedented challenges – and invaluable educational opportunities.
Senate Bill 265, a state law signed by Gov. John Kasich in January 2019 that formally recognizes pharmacists as providers throughout the state insurance code, was an exciting win for Ohio and the field of pharmacy. Several states around the country have passed similar laws, but for most, implementation has been challenging. To make sure that Ohio doesn’t suffer the same fate, the Ohio Pharmacists Association (OPA) has convened a task force, led by Stuart Beatty, PharmD, BCACP, FAPhA, associate professor of clinical pharmacy at the College of Pharmacy.

The task force is bringing together pharmacy leaders around Ohio to work with pharmacies, health insurance plans and state Medicaid officials to better integrate pharmacists into health care teams. Additionally, it is working with payors to identify where gaps exist in care and to determine how to best educate the public on the value of pharmacists.

Keeping her community healthy, educated and safe

Emlah Tubuo, PharmD ’10, owner of Powell Pharmacy, has gone the extra mile to ensure that members of her community have what they need during the pandemic. She’s offered free delivery to customers, often delivering items herself. She’s donated masks to senior living facilities and hand sanitizer to Powell’s first responders. She’s amplified her online presence to provide educational resources. And for consultations, Dr. Tubuo and her team are regularly in contact with patients through telehealth and phone calls. She even had breakfast sent to pharmacists at Nationwide Children’s Hospital.

Pharmacists provide care during COVID-19 outbreak

Pharmacists and student pharmacists are on the frontlines responding to the COVID-19 pandemic. As cases grow exponentially in the United States and around the world, citizens continue to converge on their community pharmacies for supplies and medications. While other businesses have been mandated to close their doors, pharmacies remain open—with caring pharmacists, students and staff ready to help.

Experiential education team shows extraordinary commitment to support students during time of uncertainty

As the COVID-19 pandemic has upturned daily life for people throughout the country and across the globe, students, faculty and staff at academic institutions have had to make major adjustments to how they learn, teach and work. Complicating it even more has been the uncertainty over graduation and rotation requirements for our students. Fortunately for PharmD students in the College of Pharmacy, members of the Experiential Education team have worked tirelessly to provide additional assistance and peace of mind to students in the home stretch of their academic tenure.
While Ohio has not yet seen a major transformation in pharmacy practice since the law went into effect in April 2019, the state is in a particularly good place to see progress on provider status implementation. Talks regarding pharmacists receiving payment have progressed further than other states that passed similar laws years ago.

“This is an exciting opportunity for Ohio to lead pharmacist involvement on the patient care team,” said Dr. Beatty. “By discussing pharmacist provider status implementation with the various stakeholders and payors, we have a real opportunity to change pharmacy practice across the state and serve as a model nationwide.”

In addition to Dr. Beatty, other College of Pharmacy faculty and alumni participating on the task force include:

- Marialice Bennett, RPh, Professor Emerita, The Ohio State University (alumna)
- Brigid Groves, PharmD, MS, Clinical Pharmacist, Population Health at Nationwide Children’s Hospital (alumna)
- Joseph Dula III, PharmD, Regional Director of Clinical Services, Pharmacy Systems, Inc. (alumnus)
- Catherine Kuhn, PharmD, BCACP, FAPhA, director of Strategy Consulting, Updox (alumna)
- Barry Klein, MS, RPh, owner, Klein’s Pharmacy (alumnus)
- Max Peoples, owner, Uptown Pharmacy (alumnus)
- Jennifer Rodis, PharmD, BCPS, FAPhA, Professor and Associate Dean for Outreach and Engagement, The Ohio State University (alumna)
- Kristine Mason, PharmD, MS, Assistant Professor – Practice, Pharmacy Practice and Science, The Ohio State University (alumna)
- E. Michael Murphy, PharmD, Pharmacy Advancement Fellow, The Ohio State University (alumnus)
- Vyishali Dharbhamalla, PharmD, OPA Executive Fellow in Association Management (alumna)

“We’re working with insurance companies and pharmacies to guide pharmacy practice transformation. The potential implications could be both statewide and nationwide, and that’s what we really hope to do,” Dr. Murphy said. “Our ultimate goal is to increase access to patient care. We can spend less time on dispensing and more time working one on one with patients to improve their therapeutic outcomes.”

Determining how to compensate pharmacists for clinical services is crucial to creating a direct incentive to the business that they work for.

If pharmacist provider status is successfully implemented, the impact on the pharmacists and patients would be incredibly substantial. The people who would benefit the most? Patients.

“Recognition of pharmacists as providers will allow pharmacists to practice at the top of their license and be an equal member of the health care team,” Dr. Murphy said. “It will ultimately improve the health and well-being of patients.”
Undergraduate studies had another strong year with 598 students pursuing education in the BSPS and Pharmaceutical Sciences minor programs collectively. During the 2019-20 academic year, 21 students successfully transitioned from BSPS to PharmD status through the combined degree program. Of these students, 11 were in the Early Assurance Program (EAP) and 10 applied through the competitive admissions process. For academic year 2020-21, 34 BSPS students plan to matriculate into the PharmD program through the combined degree program.

In an effort to continue to grow and expand access to the PharmD program, college faculty voted to open the EAP admissions option to current BSPS students and expand EAP access to Ohio State regional campus students.

**STUDENT AWARD RECIPIENTS**

Medicinal Chemistry Award: Jason West
Pharmacognosy Award: Jessica Grebenc
Pharmaceutics and Pharmacology Award: Bob Weber
Pharmacy Practice & Science Award: Jordan Fortunato
American Institute of the History of Pharmacy Student Recognition: Eric Yonchak
Student Impact Award: Aashtha Shah
Outstanding Graduating Student of the Year: Drug Discovery and Development Pathway: Bob Weber
Outstanding Graduating Student of the Year: Healthcare Professions Pathway: Brittany Shook
Charles River Research Student Leadership Award: Aashtha Shah
Outstanding Community Engagement: Katie Burhop
Forever a Buckeye Award: Hanbum Kim
BY THE NUMBERS

BSPS Class of 2020 Outcomes

- Accepted to PharmD Program | 47%
- Employment Offer Accepted | 9%
- Accepted to PhD Program | 5%
- Accepted to Medical School | 5%
- Accepted to Dental School | 2%
- Accepted to Optometry School | 1%
- Accepted to Nursing Program | 1%
- Still Seeking at Time of Survey | 8%
- Delaying Search (Gap Year) | 5%
- Undecided at Time of Survey | 4%
- No Response or Lost to Follow Up | 13%

EARLY ASSURANCE PROGRAM (EAP) GROWTH

LONGITUDINAL ENROLLMENT GROWTH IN UNDERGRADUATE PROGRAMS

- BSPS Major Students
- PS Minor Students

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Naloxone has been proven to save lives, but the opioid overdose antidote isn’t always in the right place at the right time. Emma Siegel and Abby Block are on a mission to change that.

The College of Pharmacy PharmD Class of 2022 students launched the Opioid Overdose Response Task Force as part of their Albert Schweitzer Fellowship, a program that provides opportunities to health-focused graduate and professional students to design and implement a public health-based project in their community.

“Emma and I designed our project around fostering community conversation about how and where to get naloxone, and why the community needs more people to carry it,” Block said. “Some of the statistics in Franklin County are pretty harrowing, and by educating different populations on how to get it, we hope to increase the number of people who carry naloxone.”

In collaboration with SafePoint, a harm-reduction program through Equitas Health in Columbus, and under the mentorship of Dr. Jennifer Rodis, assistant dean of outreach and engagement, Siegel and Block have focused on the role pharmacies play in dispensing naloxone. They surveyed pharmacies in and around Franklinton – an area west of downtown Columbus which is particularly hard-hit by the opioid epidemic – and found that on average they dispensed only 2.5 naloxone kits each month.

“There is a lot of discussion in pharmacy about the importance of naloxone accessibility,” Block said. “In Ohio especially, protocols allow pharmacies to provide naloxone without prescriptions to anyone who asks for it. It seems that for all the work done to expand access, people weren’t using pharmacies as much as they could to address overdose.”

Siegel and Block set out to educate the community about addiction and overdose so they could break down the associated stigmas and increase the access to naloxone.
“We want people to think of naloxone as something they could have in an everyday first aid kit,” Siegel said. “We want to frame the idea of naloxone as something that can be carried by anyone and everyone, like a Band-Aid or gauze.”

Siegel and Block set up tables at local recreation centers, businesses and a homeless youth drop-in center to promote community conversation and educate about naloxone access. They also have attended a health fair at the Ohio Reformatory for Women in Marysville, Ohio.

Block said that she and Siegel will continue to educate the Columbus community about naloxone access and utilization throughout this year.

“As we continue having these conversations, it is really encouraging to hear how many people are interested in normalizing naloxone use,” Block said. “If family, friends and the broader community were open to carrying naloxone, and if it’s as easy as asking your pharmacist for a kit through your insurance, maybe the stigma around overdose and addiction could be reduced and the community as a whole could do more.”

TWO PHARMD STUDENTS NAMED 2020-21 COLUMBUS-ATHENS SCHWEITZER FELLOWSHIP RECIPIENTS

Two Class of 2022 Doctor of Pharmacy students from the College of Pharmacy were selected for the 2020-2021 Columbus-Athens Schweitzer Fellowship Program. Yang Chu and Cindy Ding will work on a project they designed titled, “Impacting Older, Community-Dwelling, Asian Adults through Socialization and Health Education.” Ruth Emptage, PharmD, BCGP, assistant professor of practice in the Division of Pharmacy Practice and Science, will serve as the academic mentor for the project.

For their project, Chu and Ding will provide companionship and education to the older, community-dwelling Asian population in Columbus. They plan to set up different activities throughout the year, such as educational presentations on chronic disease state management, discussions on healthy lifestyle choices, free blood pressure screenings, Medication Therapy Management services and vaccine recommendations, under the supervision of a pharmacist preceptor. To address mental health, the two want to organize craft sessions, dance classes and meditation.

“We feel that there is a community need to provide services to this population, especially because of the language barriers and cultural differences,” said Chu, who serves as the pharmacy coordinator at the Asian Health Initiative Free Clinic near Ohio State’s campus. “This population is often faced with mental and health disparities, including the lack of emotional support, companionship and translators. Therefore, many people in this population may have challenges managing chronic illnesses. We want to address the unmet mental, physical and psychosocial needs for this population using our pharmacy knowledge, Asian background and Mandarin speaking capabilities.”
The College of Pharmacy Integrated Patient Care Lab (IPCaL) team recently received the 2020 American Association of Colleges of Pharmacy (AACP) Innovation in Teaching Award for their series, “Patient Voices: Practicing with Intent.”

The series was developed by Sean Nebergall, PharmD, and the team includes Colleen Dula, PharmD; Stacy King, BS; JD Bickel, PharmD, BCPS; Anna Haas-Gehres, PharmD, BCACP; Kristy Jackson, PharmD; and Dave Matthews, PharmD, BCACP.

Through the Patient Voices project, the IPCaL team sought to create an innovative approach to cultural sensitivity within the PharmD curriculum through integrated activities in a patient care laboratory course series. The goal of the project was to incorporate the practice of cultural humility as an element of the required curriculum, resulting in increased opportunities for students to practice respectful, empathic and inclusive pharmaceutical care.

“Diversity among patients can provide rich educational opportunities,” Dr. Nebergall said. “However, it is imperative to prepare students to interact with and care for these patients while recognizing potential unique health care barriers. By weaving the thread of cultural awareness and humility throughout the curriculum and prioritizing inclusion of marginalized groups, we can prepare students to be leaders in the equitable delivery of health care for all.”

To accomplish their objective, the team prioritized marginalized groups through a series of patient speakers and integrated lab activities. The Patient Voices series follows a framework to merge specialized topics into existing content. During a large group classroom session, the existing course content is delivered first, followed directly by a relevant Patient Voices topic. Topic discussions begin with brief introductory material about the selected patient group, including definitions and basic cultural background information. Following the introduction, students hear from a real patient. The series is titled “Patient Voices” because hearing from actual patients is the most important piece.

“Our science – and our health care systems – have long been run by and for the majority,” said Dr. Nebergall. “How can we be more inclusive if we have no platform for minority voices?”

Patients have spoken to the class in person, via videoconference call, on video or audio recording, and via written response/photo compilation in the “notecard confessional” style – and faculty took extra measures to ensure privacy for the patients. After hearing from a patient, the class discusses actionable steps pharmacists can take to effectively care for their patients. This may include topics such as therapeutic support, creating an inclusive practice, advocacy, and referral to community resources. The discussion generated from the patient testimony is a critical element in developing both the students’ understanding of the topic and how they can improve the experience of their patients. The following week in lab, existing activities are modified to include the Patient Voices topic from lecture while maintaining the original intent of the simulation. Essential to the success of this series is a process to maximize cultural competence coverage in the curriculum without adding significant class time.

College of Pharmacy faculty have long been leaders in innovative pharmacy teaching. Patient Voices is a great example of our faculty living the college’s mission of advancing the pharmacy profession and patient-centered care across Ohio and around the globe through innovative teaching and practice, groundbreaking research, and transformative outreach and engagement.
**BY THE NUMBERS**

### 2019 FIRST TIME BOARD PASSAGE RATES

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<tr>
<th></th>
<th>Ohio State</th>
<th>All ACPE-Accredited Programs</th>
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<tr>
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<tr>
<td>MPJE Pass Rate</td>
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### FOUR-YEAR GRADUATION RATES

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<tr>
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<tr>
<td>Class of 2019</td>
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<td>96.7%</td>
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<td>Class of 2017</td>
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<td>Class of 2016</td>
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**PharmD Class of 2020 Outcomes**
(as of September 2020)

- Residency or Residency Plus Master’s (MS or MBA) | 44%
- Employment Offer Accepted or Received | 30%
- Fellowship or Academic Program | 2%
- Still Seeking | 5%
- Search Delayed | 2%
- Lost to Follow Up (Non-Response) | 17%

**Residency Setting, August 2020**

- PGY1 Pharmacy Residency Program | 64%
- PGY1 Ambulatory Care Pharmacy Residency Program | 14%
- Combined PGY1 Residency - Masters Program | 11%
- PGY1 Community Pharmacy Residency Program | 7%
- PGY1 Managed Care Pharmacy Residency Program | 2%
- PGY1&2 Pharmacotherapy | 2%

**Employment Setting, August 2020**

- Community Pharmacy | 72%
- Industry | 14%
- Hospital Pharmacy | 5%
- Academic Pharmacy | 3%
- Nuclear Pharmacy | 3%
- Armed Forces | 3%
GRADUATE STUDIES

THREE GRADUATE STUDENTS PUBLISHED IN HIGH-IMPACT JOURNAL

Peter J. Blanco Carcache, Garima Agarwal and Ermias Mekuria Addo worked with their advisor, Dr. A. Douglas Kinghorn, to publish a major review article, “Current status and contemporary approaches to the discovery of antitumor agents from higher plants,” in the journal *Biotechnology Advances*.

According to research published by the American Cancer Society, cancer is the second leading cause of death in the United States. Higher plant constituents have afforded clinically available anticancer drugs.

The group’s article on higher plants:

- Summarizes the small organic molecules obtained from higher plants and their derivatives currently on the market and in clinical trials as single chemical entity cancer agents;
- Demonstrates the constituents of botanical dietary supplements that have shown potential anticancer properties, in particular those from noni and mangosteen;
- Discusses new approaches to the purification of biologically active plant extracts containing thousands of individual compounds and the use of hyphenated analytical techniques and molecular networking in rapid dereplication procedures;
- Demonstrates the application of biotechnological strategies, including different formulations, such as micelles and nanoparticles; and,
- Describes antibody-drug conjugates (ADCs) and their role in enhancing targeted drug delivery using natural product-derived molecules.

Peter Blanco Carcache and Ermias Mekuria Addo are both PhD students in Dr. Kinghorn’s lab in the Division of Medicinal Chemistry and Pharmacognosy. Dr. Garima Agarwal recently graduated and now works in Dr. Craig McElroy’s lab in the college.

*Biotechnology Advances* has an impact factor of 12.8.
In December 2019, the proposal for a change in delivery for the Master of Science in Pharmaceutical Sciences with a specialization in Health-System Pharmacy Administration was approved by OAA and the Graduate School. The new 100%-online track designed for working professionals will be in addition to the in-person/residency curriculum and began enrolling in autumn 2020.

**Merge of PhD Specializations:**
In summer 2019, the Divisions of Pharmaceutics & Pharmaceutical Chemistry and the Division of Pharmacology merged to form the new Division of Pharmaceutics & Pharmacology.

### BY THE NUMBERS

#### ENROLLMENT, DEMOGRAPHIC AND GRADUATION DATA FOR THE PHARMACEUTICAL SCIENCES GRADUATE PROGRAM

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<td>5.31</td>
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Merge of PhD Specializations: In summer 2019, the Divisions of Pharmaceutics & Pharmaceutical Chemistry and the Division of Pharmacology merged to form the new Division of Pharmaceutics & Pharmacology.
A bioengineering technique to boost production of specific proteins could be the basis of an effective vaccine against the novel coronavirus that causes COVID-19, new research suggests. The study is published in the journal *Advanced Materials*.

Scientists manipulated a natural cellular process to ramp up levels of two proteins used by the virus to infect other cells, packaged the protein-boosting instructions in nanoparticles and injected them into mice. Within a month, the mice had developed antibodies against the SARS-CoV-2 virus.

The technique involves altering specific sequences of messenger RNA, molecules that translate genetic information into functional proteins. While these sequences are not translated to proteins, the researchers changed their structures to promote higher-than-usual levels of proteins. The sequences are known as untranslated regions, or UTRs.

“We’ve been engineering messenger RNA for four years, and earlier this year we made some progress identifying a role for UTRs – and then COVID-19 happened,” said Yizhou Dong, PhD, senior author of the study and associate professor of pharmaceutics and pharmacology.

Though Phase 3 clinical trials of fast-tracked COVID-19 vaccine candidates are in progress, Dr. Dong said his lab’s platform offers a potential alternative.

“If the current vaccines work well, that’s wonderful. In case the field needs this, then it’s an option. It worked as a vaccine is expected to, and we can scale this up very fast,” he said. “For now, it’s a proof of concept – we’ve demonstrated we can optimize a sequence of messenger RNA to improve protein production, produce antigens and induce antibodies against those specific antigens.”
The crux of the method is typical to vaccine development: using snippets of a pathogen’s structure to produce an antigen – the foreign substance that triggers an appropriate immune response – and finding a safe way to introduce it to the body.

But the engineering technique takes antigen design to a new level by making use of messenger RNA UTRs, Dr. Dong said.

His lab worked with the two UTRs that bookend the start and finish of protein assembly, functioning as regulators of that process and influencing how the resulting protein interacts with others. UTRs themselves are strings of nucleotides, the molecules that compose RNA and DNA.

“For our application we tried to optimize the UTRs to improve the protein production process. We wanted as much protein produced as possible – so we can give a small dose of messenger RNA that produces enough antigen to induce antibodies against the virus,” Dr. Dong said.

The team experimented with two potential antigens that the novel coronavirus is known to use to cause infection: a spike protein on its surface and a receptor binding domain, a component of the spike protein, that the virus uses to make its way into host cells – a necessary step to make copies of itself. Both are used in other SARS-CoV-2 vaccine candidates.

After manipulating the messenger RNA for these two proteins, the team encased them in lipid nanoparticles developed previously in Dr. Dong’s lab. They injected mice with the experimental vaccine and gave them a booster two weeks later. A month after the first injection, immune cells in the mice had taken up the antigens of the two proteins and developed antibodies against them.

“It takes some time for the immune system to process the antigens and have cells produce antibodies,” Dr. Dong said. “In this study, we detected antibodies after 30 days.”

And even if this vaccine candidate is not needed for COVID-19, he is continuing to refine this latest method of engineering messenger RNA.

“UTR is a platform that we can apply to any type of messenger RNA. We are exploring other therapeutics,” Dr. Dong said.
FOSTERING GROUNDBREAKING DISCOVERIES AND ADVANCING PATIENT CARE

Since 1885, the College of Pharmacy has explored new frontiers in drug discovery and development, pharmaceutical sciences and translational clinical science. Over the last four years, the college has seen the highest totals of NIH and total research funding ever recorded by the college — more than $45 million total. This funding contributed to 57 patents and 79 inventions in the past five years.

The college has made several significant investments into its research program recently, spending 21% of its fiscal year 2019 budget in this area. Research spending has gone to strategic initiatives such as renovating laboratories, moving and renovating its Shared Instrumentation Facility, awarding inaugural Dean's Innovative Research Awards to support faculty pursuing submission or resubmission of extramural grant proposals, and more.

The college has also continued its important collaborations and partnerships with entities across campus and around the globe. In 2019, the college entered a 10-year partnership with The Ohio State University Comprehensive Cancer Center – Arthur G. James Cancer Hospital and Richard J. Solove Research Institute (OSUCCC – James) to expand drug discovery and development in cancer and cancer-related diseases. Through the agreement, the OSUCCC – James will invest approximately $15 million for renovations of more than 19,300 square feet of the COP Division of Medicinal Chemistry and Pharmacognosy space on the third and fourth floors of Parks Hall. An additional $3 million will be allocated toward a Small Molecule Screening Facility, a shared COP and OSUCCC – James resource that will be directed by Blake R. Peterson, PhD, chair of the Division of Medicinal Chemistry and Pharmacognosy and John W. Wolfe Chair in Cancer Research. Researchers at the college have also drawn national attention for consequential research on everything from natural products to infectious diseases to cancer and RNA Nanotechnology, and more.

As our researchers continue their groundbreaking work and service, the college continues to make improvements to better support the research being performed. In the fall of 2019, faculty approved a reorganization of the college into five divisions that include three research divisions. The college’s divisions now include:

- The Division of Medicinal Chemistry and Pharmacognosy (chaired by Blake Peterson, PhD)
- The Division of Outcomes and Translational Sciences (chaired by Marcia Worley, PhD)
- The Division of Pharmaceutics and Pharmacology (chaired by Sharyn Baker, PharmD, PhD)
- The Division of Pharmacy Practice and Science (chaired by Bella Mehta, PharmD)
- The Division of Pharmacy Education and Innovation (chaired by Kristin Casper, PharmD)

The Division of Outcomes and Translational Sciences was created to drive research in the laboratory, clinic and community to establish best practices that optimize individual and population health and outcomes. Five researchers will focus primarily on clinical outcomes and bedside practice research. The division expects to see significant growth over the next five to seven years.

“Creating this new division in the college will set a trajectory to build a critical mass of researchers with expertise in translational and outcomes research, and will serve as a catalyst for collaborations that will help to optimize medication use and improve health outcomes,” Dr. Worley said. “With this new division, we will build postgraduate training opportunities for the next generation of scientists in these areas, as well. Building on the experience of its members, the division will provide a platform for research collaborations to achieve these goals.”

There has never been a more exciting time at the College of Pharmacy. The changes that the college makes today put us in a better position to continue the groundbreaking research and innovative teaching of tomorrow. The expertise of the college’s researchers and faculty, the dedication of its students and the generous support of its donors make it possible for the college to continue generating breakthrough discoveries and advancing patient care for the next 135 years and beyond.
BY THE NUMBERS

Total Research Awards Federal FY2019- $10,205,991 (↑ 1.3% from 2018)
Research Award Funding Types (AACP Federal Fiscal Year 2019)

- National Institutes of Health | $8,362,915 | 82%
- Industry | $690,952 | 7%
- Private Agencies | $524,756 | 5%
- Department of Defense | $475,011 | 5%
- National Science Foundation | $79,192 | 1%
- Other Federal | $66,762 | < 1%
- Department of Agriculture | $6,403 | < 1%

Total NIH Awards Federal FY2019- $8,362,915 (↑ 2.0% from 2018)
NIH Research Awards by Institute (AACP Federal Fiscal Year 2019)

- NCI-Natl Cancer Inst | $4,638,996 | 59.2%
- NHLBI-Heart Lung Blood | $1,361,337 | 17.4%
- NIGMS-Gen Med Sciences | $427,840 | 5.5%
- NIAID-Allergy & Inf Disease | $390,000 | 5.0%
- NCATS-Adv Trans Scis | $359,991 | 4.6%
- NIBIB-Biomed Img & Bioeng | $346,498 | 4.4%
- NIDA-Drug Abuse | $209,131 | 2.7%
- NINDS-Neuro Disord & Stroke | $66,126 | 0.8%
- NICHD-Child Health Hum Dev | $35,600 | 0.5%

2016-2020

PATENTS ISSUED

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LICENSES

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ACTIVE LICENSING DEALS

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Faculty from the College of Pharmacy have been working since 2013 through two grants to expand patient access to care through pharmacist-provided services. These efforts started with a grant to create a statewide Medication Therapy Management (MTM) Consortium, led by Dr. Jen Rodis, and funded through the Ohio Department of Health (ODH) to expand MTM in Federally-Qualified Health Centers (FQHC) in the state of Ohio and create a network for continued practice growth in the state.

After the first grant concluded in 2018, ODH wanted to focus on community health centers for a continuation of the project. ODH awarded the Ohio Association of Community Health Centers (OACHC) a grant focused on Diabetes and Hypertension Quality Improvement. This project has six pathways:

- Screening, testing and referring for prediabetes
- Management of patients with diabetes
- Identifying and diagnosing hypertension
- Management of patients with hypertension/high blood cholesterol
- Establishing or expanding medication therapy management (MTM) services
- Linking patients to community resources to improve management

Dr. Alexa Valentino
Dr. Alexa Valentino, assistant professor of clinical pharmacy, is leading the MTM pathway, supporting the use of pharmacists to manage long-term disease states. This includes taking the reins and chairing the MTM consortium initiated during the first grant and serving as a resource to pharmacists across the state, helping them understand opportunities that are available, supporting and facilitating expansion of services, and preparing them for provider status roll out. Dr. Valentino is funded to lead this pathway through 2023.

“The work we are doing with the Ohio Association of Community Health Centers is important in creating a network among pharmacists in community health centers,” Dr. Valentino said. “We are leveraging the expertise of pharmacists with established services and learning from each other. It is exciting to see the connections that are being made and how the learning collaborative is helping pharmacists to advance practice within their clinics and pharmacies.”

Through these grants, Drs. Valentino and Rodis have and continue to expand the services that pharmacists provide around the state – improving patients’ access to care.

**HIGHLIGHTS**

**NOTEWORTHY STUDENT ENGAGEMENT THROUGH COMMUNITY HEALTH SERVICE**

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<td>Average number of hours per student</td>
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<td>Number of people reached through faculty-led O&amp;E programming</td>
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**GRANTS**

Funding received by faculty, staff, students and community partnerships this past year totaled $708,589

**CONTINUING PROFESSIONAL DEVELOPMENT**

The college provided 97 hours of continuing pharmacy education (CPE) credit to 508 pharmacists and 122 students, applied for $541,062 in competitive funding and new contract opportunities, and increased collaborations with the Ohio State Wexner Medical Center through the 2019-20 academic year.
ALUMNUS HELPS STUDENTS STEP OUT OF THE CLASSROOM AND EXPERIENCE UNIVERSITY LIFE

Jerry Hudec knows first-hand the impact philanthropy has on students. The 1967 graduate was the beneficiary of a scholarship each of the four years he spent earning his bachelor’s degree at the College of Pharmacy.

“The dollar amount I received seems small now compared to the current tuition expense, but it was a great assist in completing my degree,” Hudec said. “I am gratified that I can contribute back to the college so that others may benefit as I did.”

Hudec has paid forward the support he received as a student through a steady stream of donations. This year, Hudec and his wife, Jody, made a legacy gift and designated the college as a beneficiary of their estate plan. Their gift is meant to ease the financial burden on future generations of students so that they can fully experience what Ohio State has to offer.

“Many of the students I have spoken with seem to have jobs in addition to attending school. That is certainly not surprising given the money and time required to complete a degree,” he said. “However, having worked and attended college at the same time, I have realized in retrospect that one misses a lot of experiences that expand a student’s education and appreciation outside of a course of study.”
Hudec is hopeful that his legacy gift will grant students the freedom to explore what a large university like Ohio State has to offer.

“There is an abundance of activities on the campus and in the surrounding area – both in academic and cultural areas – that enhance a student’s education and provide a basis for expanding one’s interests as they pursue their careers,” Hudec said. “Having a job certainly reduces those opportunities, and I am hopeful that scholarship funds will allow students to utilize these life-enhancing opportunities.”

In addition to student tuition support, Hudec made his gift to contribute to the goals and objectives of the college.

“I believe that education is extremely important not only in personal development but also in the advancement of populations everywhere,” he said. “The College of Pharmacy has done an excellent job of training highly qualified healthcare providers in addition to fostering academic research that has enhanced and advanced health care.”

**Total Fundraising Activity (cash and future gifts):**

$4.2 million

5th highest total for past 20 years

**New Revenue (cash received):**

$3.9 million

12% above goal

**The college’s second best year for private grants and sponsored research:**

$2.4 million

**Four new permanent endowments approved by the Board of Trustees:**

- The Clarence and Rebecca Archer Scholarship Fund
- The Larry Robertson Endowed Fund
- The Thomas and Frances Scono Endowed Fund
- The James A. Visconti Memorial Publication Endowment

**Annual Giving results increased 33% over the previous year**