THE FUTURE OF PHARMACY
Predictions for the field over the coming decade
One of the top 10 pharmacy schools nationwide and the highest-ranked private school, the USC School of Pharmacy continues its century-long reputation for innovative programming, practice and collaboration. The school created the nation’s first Doctor of Pharmacy program, the first clinical pharmacy program, the first clinical clerkships, the first doctorates in pharmaceutical economics and regulatory science, and the first PharmD/MBA dual-degree program, among other innovations in education, research and practice. The USC School of Pharmacy is the only private pharmacy school on a major health sciences campus, which facilitates partnerships with other health professionals as well as new breakthroughs in care. It also is the only school of pharmacy that owns and operates five pharmacies. The school is home to the International Center for Regulatory Science at USC, and is a partner in the USC Leonard D. Schaeffer Center for Health Policy & Economics and the USC Center for Drug Discovery and Development. The school pioneered a national model of clinical pharmacy care through work in safety-net clinics throughout Southern California and is a leader in the safe, efficient and optimal use of medication therapy that can save lives and improve the human condition.

Results magazine, published semi-annually, highlights some of the school’s latest advances and achievements, as well as the faculty, students, alumni and donors who make this work possible.
The Future of Pharmacy

Since our founding in 1905, the USC School of Pharmacy has advanced the field through pioneering education, research and clinical initiatives. This drive to improve the health of individuals and communities, develop breakthrough discoveries and ensure our students are well-prepared for leadership roles is central to our mission.

The role of the pharmacist is rapidly evolving into an increasingly essential member of the healthcare team. Meanwhile, biomedical research is at a key turning point, building upon the convergence of diverse fields — from genomics to chemistry and mathematics to engineering — to more rapidly translate novel laboratory insights into promising new treatments.

Thinking long term, we must consider some of the major changes and challenges in biomedical research, clinical practice and health outcomes research that will affect how we educate the next generation, including the:

› transformation of descriptive sciences to information sciences
› integration of biology, population and social sciences
› reality that the distance between a nucleotide and an organism is eclipsing
› the numerous determinants of disease beyond medical, including social, economic, environmental, governmental and housing issues
› knowledge that diseases are dynamic and not static states of health
› early intervention of regulation, policy and socioeconomic impact analysis on drug discovery and development

Our cover story focuses on the future of pharmacy. In the wake of Amazon’s purchase of PillPack and the ongoing national deliberations on the future of the Affordable Care Act, we asked faculty, alumni, students and friends to share their thoughts on what the field will look like over the next decade. One thing is abundantly clear: The USC School of Pharmacy will continue to be a leader in transforming the future of this dynamic, multifaceted profession.

In this issue, you will meet Jean Pallares, PharmD ’84 — a second-generation Trojan pharmacist who became Los Angeles County’s chief pharmacy officer in July. She is also a clinical member of our faculty. In addition, you’ll read about Senator Jeff Stone, PharmD ’81 — the only pharmacist in the state legislature — and his ongoing efforts to improve the health of Californians.

This issue also features Research Professor Jing Liang’s investigation of the medicinal power of the Japanese raisin tree as a treatment for Alzheimer’s, Parkinson’s and other conditions. And longtime Professor Enrique Cadenas is recognized in these pages for winning three major awards this year.

We include highlights from this year’s commencement ceremony — including the first graduate of our new BS in Pharmacology and Drug Development — and you’ll have the chance to “travel” with some of our students on their international internships and summer rotations.

Every day, our faculty, alumni, students and donors are driving crucial advances in pharmacy and pharmaceutical sciences. Your support fuels this progress, and we thank you for your partnership.

Join with us to create the future of pharmacy.

Vassilios Papadopoulos, DPharm, PhD, DSc (hon)
Dean, USC School of Pharmacy
John Stauffer Decanal Chair in Pharmaceutical Sciences

T-cells and lymphoma cancer cell. Composite colored scanning electron micrograph of T-cells (purple) and a lymphoma cancer cell (pink). T-cells are a component of the body’s immune system. Chimeric antigen receptor (CAR) T-cell therapy takes T-cells from a patient’s bloodstream and reprograms them to recognize a specific protein found on lymphoma cells. The T-cells are reintroduced to the patient’s blood system, where they find and attack the lymphoma cells. Early trials indicate that CAR T-cell therapy is effective for the treatment of lymphoma in patients with no other good treatment options. Magnification: x9,000 when printed at 10 centimeters.
(See related quote from Daryl Davies in the cover story, page 15.)
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Members of the PharmD Class of 2022 at the White Coat ceremony in August
FROM ANCIENT REMEDY TO POTENTIAL ALZHEIMER’S TREATMENT

Having shown the power of an ancient Chinese hangover remedy, Research Professor of Clinical Pharmacy Jing Liang is now determined to unlock the mysteries of its effectiveness. The answers she finds could lead to potential treatments for Alzheimer’s, Parkinson’s, post-traumatic stress disorder (PTSD) and anxiety, among other conditions.

“In China, we have so many medicinal herbs,” says Liang, who moved to the U.S. in 1997 after earning her medical degree and PhD at Tokyo University School of Medicine. “I thought, what if some of them worked for alcohol-use disorder?” So she took a leave of absence from her position in an alcohol-research laboratory to return to her native country, spending three months in Guangzhou, South China, where she purified various herbs and evaluated their effects.

Liang alighted on *Hovenia dulcis* — the Japanese raisin tree — the leaves of which were first brewed into a hangover-fighting tea around 660 BC. She identified its active ingredient, dihydromyricetin (DHM), as a novel anti-alcohol medication in a landmark 2012 study. Not only does DHM seem to prevent the next-day fog that is the inevitable price of overindulgence, but it also demonstrates liver-protective properties.

After reading about Liang’s research, former Tesla engineer and entrepreneur Sisun Lee contacted her for help in formulating a recovery drink for commercial release. With Liang as medical advisor, Lee established the company 82 Labs, releasing the popular Morning Recovery supplement.

For Liang — who joined the USC School of Pharmacy in 2014 — the research enabled a return to what led her to the medical profession in the first place: an interest in neurodegenerative diseases and aging.

Just as DHM blocks alcohol from affecting the brain’s gamma-aminobutyric acid (GABA) receptors, it also may restore GABA synapse functionality to improve memory and learning abilities.

“The GABA receptor must have something to support,” Liang explains. “And this support layer is the gephyrin protein.” In Alzheimer’s patients, that protein is reduced by half, resulting in what she calls the “silent synapses” — signals are sent but find no response. “That is how cognition is lost,” she says.

Liang has identified the gephyrin-GABA, receptor pathway as a target for treating Alzheimer’s with DHM, and her discovery holds potential for combating other neurological disorders as well.

“For example, she has great anecdotal evidence for DHM’s potential effectiveness against Parkinson’s disease,” says Daryl Davies, a professor in the USC School of Pharmacy’s Titus Family Department of Clinical Pharmacy who is collaborating with Liang on this research. He adds that an advantage of using DHM to treat anxiety, alcohol-use disorder and PTSD is that, unlike current anxiety and alcohol-withdrawal medications such as diazepam, DHM is nonaddictive.
To date, DHM has been used in the U.S. only as a nutritional supplement, with its pharmaceutical applications yet to be fully explored and validated through evidence-based research. Morning Recovery’s growing popularity demonstrates DHM’s effectiveness as a recovery drink that can reduce or eliminate the “rebound effect” alcohol has on your brain. Now the USC researchers aim to understand why it has that effect.

“We want to know how DHM protects the liver,” Davies says. “Does it reduce the level of the toxins, acetaldehyde? Does it speed up metabolism of ethanol? Dr. Liang has anecdotal data that it does both, but now we want to understand the mechanisms behind its effectiveness.”

As the team undergoes the process of what Davies calls “reverse engineering” DHM, they have a crucial head start. “We know these products are safe for long-term use, because she has done the safety and toxicity studies already,” he adds.

The USC team also has a plan for tackling a key challenge of translating traditional Chinese medicines into approved pharmaceutical products: reliable ingredient sourcing and batch-to-batch consistency.

“A weakness of Chinese traditional medicines is that they’re hard to replicate,” Davies explains. “People understand that the location where wine grapes or coffee beans are grown makes a difference in flavor and quality, but they don’t seem to understand the concept when it comes to medications. They think, ‘I can get DHM from China and put it into anything. Or I can grow Hovenia anywhere.’ But you have to understand how and where it was grown, how it was harvested, and then ensure quality and batch-to-batch consistency.

What are the active ingredients and how are they administered?” The USC studies will ensure quality and batch-to-batch consistency.

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What are the active ingredients and how are they administered?” The USC studies will control for all of those aspects.

In the meantime, Liang has created another supplement, called Smarto-One, that is undergoing a small-scale clinical trial for Alzheimer’s in China. Those who have taken the supplement have shown significant improvement, she says.

The potential is enormous. “If her product works for Alzheimer’s — even if it helps people’s quality of life by 20 percent — that’s a lot more than what’s out there right now,” Davies says. “And it’s something that can be administered at a reasonable cost.”

AARDVARC Digs Deep

While it may seem like a misspelling of the burrowing animal, AARDVARC® actually stands for Automated Approach to Reviewing and Developing Valuable Assessment Resources for your Curriculum. The USC School of Pharmacy developed and is implementing this new, web-based system to streamline and automate procedures ranging from curricular and programmatic assessment to business aspects.

“AARDVARC allows us to dig deep into the school’s data and sift through it,” says Maryann Wu, assistant dean for assessment. “It will improve our ways of evaluating teaching methods and educational outcomes, as well as ensure that we keep pace with all Accreditation Council for Pharmacy Education standards.”

AARDVARC — developed by Wu, Associate Professor Ian Haworth and PhD student and computer programmer Dab Brill — received provisional patent status in March 2018 with the legal and financial support of the USC Stevens Center for Innovation.

Long-term goals include:
» Broadening software sharing with other universities and schools of pharmacy
» Expanding the syllabus template to the school’s Introductory Pharmacy Practice Experiences and Advanced Pharmacy Practice Experiences
» Giving students the opportunity to review syllabi before they begin a course or rotation
» Collecting data on course readings and textbooks to facilitate coordination with the bookstore and library
» Creating more flexibility in organization and appearance of syllabi
» Allowing review of faculty and curriculum data historically over time
» Integrating with learning management systems such as Blackboard

Capping the Pocket

The pain of specialty drug costs is especially acute for certain Medicare Part D patients, since the program places no cap on out-of-pocket expenses for outpatient prescriptions. A new study co-written by Geoffrey Joyce — chair of the USC School of Pharmacy’s Department of Pharmaceutical and Health Economics and director of health policy at the USC Schaeffer Center for Health Policy & Economics — examines the benefits of limiting these costs to add financial protection for consumers.

Currently, instead of a cap, a Part D beneficiary must spend about $5,000 in out-of-pocket costs on prescriptions before catastrophic coverage kicks in. Even then, patients pay 5 percent of the cost of all such drugs for the rest of the year, which can add up to a lot.

While the federal government pays all or most of the prescription cost-sharing for low-income Part D enrollees, other beneficiaries with high drug expenses no longer qualify for this support. The research team found the share of those not getting assistance jumped from 18 to 28 percent between 2007 and 2015.

The National Institute on Aging supported the research. The study was published in the July 2018 issue of Health Affairs.
SERVING THE UNDERSERVED

In her new role as Chief Pharmacy Officer for the Los Angeles County Department of Health Services, second-generation Trojan Jean Pallares, PharmD ’84, oversees the medication needs of the nation’s second largest municipal system of care. With nearly 4.5 million patients and a network including four hospitals and numerous ambulatory care sites and clinics, she is excited by the possibilities and responsibilities alike.

“To be part of an operation this large at a major time of transition for the profession itself is the chance of a lifetime,” says Pallares, who began her tenure in July 2018. “We aim to have our pharmacists and students practice at the frontier of what the professional licensure allows them to do.”

She also is inspired by the opportunity to better meet the needs of patients who might not otherwise receive care. “We’re serving the underserved,” she adds.

Pallares also plans to bring her department even closer together with her alma mater through additional teaching opportunities. “Pharmacists can utilize students as extenders to help with their work while they gain invaluable professional experience,” she explains.

She has viewed teaching as pivotal to the profession’s advancement ever since she directed Pharmacy and Laboratory Services at Pasadena’s Huntington Hospital, which provides clinical clerkships for approximately 50 students per year.

“The teaching aspect helps motivate pharmacists to stay at the top of their game,” Pallares observes.

At Huntington Hospital, she worked her way up to director after starting in an internship facilitated by the USC School of Pharmacy. Like the school, she says, “Huntington Hospital has always been at the forefront of encouraging pharmacists to be creative.”

Pallares now enjoys bringing such creativity to pharmacy services for the entire county. Yet, as both a pharmacist and a Trojan, she follows a family tradition. Her late father, Oscar Pallares, PharmD ’55, owned a number of independent pharmacies, served on the school’s Board of Councilors for many years and was a major donor. Pallares’ mother, Mary, studied at what is now the USC School of Dramatic Arts and continues serving in the Trojan League.

“My parents met at USC and it was always an important part of their lives,” Pallares says. “Trojans stay connected with each other.”

That connection also includes her husband and brother, while her son continues the heritage as a graduate of the USC Viterbi School of Engineering. “It’s just part of the family,” she says.
PLAUDITS FOR POSTERS
Third-year PharmD students presented 70 original studies at the USC School of Pharmacy’s inaugural Scholarly Project Symposium. Research by the 183 candidates spanned specialty pharmacy, transitions of care, pain management, ambulatory care pharmacy, infectious diseases and public health. Panels of faculty, staff, alumni and preceptors judged the results.

Rory Kim, assistant professor of clinical pharmacy and the symposium’s faculty organizer, wanted to create an interactive atmosphere similar to professional research conferences. “We decided to use the poster format to keep presentations short and to encourage students to submit their work to local and national pharmacy conferences,” he says.

Student Jonathan Hwang — who co-presented research evaluating the drug alvimopan in speeding recovery after bowel surgery — appreciated the opportunity to combine scholarship with his professional experience at a pharmacy. “My team developed the idea in conjunction with our pharmacy manager and used data we had on file to fuel our research,” he says.

Tanya Markary — whose team won one of the two Dean’s Recognition Awards for developing a website enabling students to learn pharmaceutics at their own pace — says she and her fellow team members look forward to expanding their project. “Our next step is to test the website with the incoming pharmacy students as part of their pharmaceutics class,” Markary adds.

“At the USC School of Pharmacy, we are continuously looking for innovative approaches to education,” says Ian Haworth, associate professor of pharmacology and pharmaceutical sciences.

The 2018 awards and winners were:
Alumni Board Award for Excellence in Scholarship:
» Isabel Chu, Michael Formica, Helen Tran and Miranda Wong for “Impact of the Bedside Pharmacy Program on 30-Day Readmissions”

Dean’s Recognition Awards:
» Stephanie Mac and Nicole Pepe for “Effects of Obesity/Diabetes on the Cytokine Response and Outcome of Patients with Staphylococcus aureus Bacteremia”
» Kenna Patel, Navneet Multani, Tanya Markary and Dab Brill for “Use of TYPS Website with USC School of Pharmacy Pharmaceutics Students”

People’s Choice Award:
» Kim Tran, Liana So, Jennifer Quach and Michele Nguyen for “The Impact of Emotional Intelligence on Academic Performance for Pharmacy Students at the University of Southern California”

At the USC School of Pharmacy, we are continuously looking for innovative approaches to education.”
Ian Haworth, associate professor of pharmacology and pharmaceutical sciences
SPECIALTY PHARMACY EARN ACCREDITATION

The Keck Medicine of USC Specialty Pharmacy has earned Utilization Review Accreditation Commission (URAC) Accreditation in Specialty Pharmacy through March 2021. This status demonstrates a comprehensive commitment to quality care, improved processes and better patient outcomes.

Open since January 2016, the specialty pharmacy is a collaborative project between the USC School of Pharmacy and Keck Medicine of USC. It services the oncology, hepatology, neurology, rheumatology, dermatology and gastroenterology divisions at Keck.

“URAC accreditation is a testament to the delivery of exceptional pharmaceutical care by the team at the Keck Medicine of USC Specialty Pharmacy,” says Raffi Svadjian, executive director of Community Pharmacies.

Clinical pharmacists counsel every patient as they begin a new therapy and regularly follow up to assess for adverse reactions, barriers to adherence and efficacy.

Reducing Hospital Readmissions and Healthcare Costs

Pharmacist-run transition-of-care programs reduce the likelihood of high-risk patients returning to the hospital, according to a USC-led study.

“The evidence is clear: Transition-of-care programs by pharmacists — including telephone follow-up, discharge counseling and medication reconciliation — are successful in reducing hospital readmissions and decreasing healthcare costs,” says Jeffrey McCombs, associate professor at the USC School of Pharmacy and director of graduate studies at the USC Schaeffer Center for Health Policy & Economics.

In a program tested at Kern Health Systems in Bakersfield from April 2013 to March 2015, pharmacists from Synergy Pharmacy Solutions oversaw the transition of about 1,100 high-risk Medicaid patients discharged from the hospital. Synergy pharmacists called these patients two to four days after discharge to offer help in resolving any medication-related problems.

USC researchers found that the program reduced the risk of hospital readmission within six months by 32 percent, saving the health plan $2,139 per patient referred, compared with patients receiving the usual discharge care. These estimates are likely conservative, as the analysis included all patients referred, including those who refused service. Findings from the study were published in the American Journal of Managed Care in March 2017.

For the February 2018 study published in the Journal of Managed Care & Specialty Pharmacy, the investigators then created a budget impact model to simulate the economic effects of expanding such transition-of-care services over a two-year period. According to their analysis, doubling the eligible patient population would lead to cumulative cost savings to the health system of more than $25 million.

“The budget-impact analysis shows that pharmacist-run transition-of-care programs, when implemented effectively, could provide really significant savings for health systems,” says Danielle Colayco, PharmD ’08, MS ’10, co-author of the 2018 study and director of health outcomes and value strategy at Komoto Healthcare.

Weiyi Ni, MA ’16, PhD Health Economics ’17, was lead author of the 2018 study, which was funded by the Komoto Family Foundation.

Louie Promoted to Professor

Stan Gee Louie has been promoted to professor in the Titus Family Department of Clinical Pharmacy. Louie, who joined USC in 1989, is nationally lauded for his translational research spanning HIV, cancer and neurodegenerative disorders. His laboratory develops drugs for treating infections, malignancies and neurodegenerative diseases, as well as traumatic brain injury and ophthalmologic injury. Under his leadership as director of the Clinical and Experimental Therapeutics (CXPT) graduate program, the school recently developed a new master of science degree that emphasizes research in translating basic science discovery in chemistry, pharmacogenomics, molecular pharmacology, inflammatory diseases, infectious disease and oncology into therapeutic modalities.
Treating Prostate Cancer With Antidepressants

A USC School of Pharmacy study led by University Professor Jean Chen Shih offers new evidence that the monoamine oxidase-A enzyme (MAO-A) pathway could be an important target in restraining prostate cancer growth.

Pioneering work previously conducted by Shih revealed the role the MAO-A gene plays in depression and other mental illnesses, as well as autism and aggression. Research has shown increased MAO-A expression in certain cancers. Yet the biological function of MAO-A in tumor development remained unknown — until now.

In a study published in Oncogene, Shih and her co-investigators examined the role MAO-A plays in the progression of prostate cancer. They crossed an MAO-A knockout mouse (a mouse in which a gene’s expression is inhibited) with a conditional PTEN knockout mouse model possessing a similar genetic defect to human prostate cancer patients. The MAO-A gene expression was inhibited in the resulting (PTEN)/MAO-A double knockout mouse model. Knocking out a gene’s expression offers valuable insights into how that gene functions.

The findings show that inhibiting MAO-A expression reduces prostate cancer development by decreasing cell proliferation and cancer stem cells.

Because MAO-A inhibitors are successfully being used to treat other diseases linked to this enzyme, such as depression, Shih and her collaborators believe the right inhibitors also hold the potential to restrain prostate cancer growth.

“We’ve found MAO is increased in prostate cancer, glioma and lymphoma. In these three cancers, we think the patient may benefit by treatment with MAO inhibitors,” explains Shih, who holds the Boyd P. and Elsie D. Welin Professorship in Pharmaceutical Sciences, and serves as director of the USC-Taiwan Center for Translational Research.

According to the American Cancer Society, more than 29,000 deaths from prostate cancer will occur in 2018, putting the disease just behind lung cancer as the leading cause of cancer death in American men. One man in 9 will be diagnosed with prostate cancer during his lifetime.

“The results of this study are significant as they suggest that the MAO-A pathway is an important target in prostate cancer,” says study co-author Mitchell Gross of the Keck School of Medicine of USC. “This is especially exciting because MAO inhibitors are already FDA-approved and available to treat depression.”

The results are being tested now in human clinical trials, treating prostate cancer patients with MAO inhibitors. “The preliminary data are promising,” Shih notes.

Funding for the research was provided by the Department of Defense and the Daniel Tsai Family Fund.
Pharmacist First

Even after 26 years as a politician, Jeff Stone considers himself a pharmacist first. The California state senator, who earned his PharmD from the USC School of Pharmacy in 1981, represents the 28th district while championing healthcare issues as one of only five medical professionals — and the only pharmacist — in the legislature.

He got interested in the business of healing at a young age — influenced in part by his uncle, a physician revered in the family, but also by a memorable early experience. Stone’s grandfather owned a shoe store in Santa Monica and used to take him along on Saturdays. One weekend, when Stone was 5 or 6, he saw a boy about his age with leg braces. His grandfather explained that the boy had polio and would never again walk unaided.

“I asked, ‘Why can’t they just give him a pill and make him better?’” Stone remembers. “My grandfather said: ‘Well, they don’t make that pill yet. Maybe you’ll have the opportunity I didn’t have to get an education and one day help discover a cure.’”

Spurred on at that early age, Stone says, “I knew I was going into the healthcare field in some way.” Meanwhile, watching his grandfather run a successful business gave greater specificity to Stone’s youthful plans.

Two years after earning his PharmD, Stone opened his first small business, Temecula Pharmacy. “I moved here because I wanted to have a Cheers kind of relationship with my customers, where people walked in and you knew their name,” he says, referencing the then-popular television series set in a Boston bar. “I wanted to be part of a community — to be the community pharmacist.”

He later owned a total of six pharmacies, five in Riverside County and one in Orange County. He still maintains one, Innovative Compounding Pharmacy in Murrieta.

“Establishing a compounding-only pharmacy allowed me to use the general chemistry, biochemistry, microbiology and other pharmacy classes as tools to prepare and make drugs,” Stone says. “It reinforced for me that this was just a great profession to pick.”

The pharmacy profession also proved invaluable when he entered politics.

After attending a city council meeting to urge action against rampant graffiti, Stone decided to run for a seat in 1992. “According to the Gallup poll, pharmacists are the most respected profession out there, year after year,” Stone notes.

He defeated the city’s mayor pro tem and ended up serving 12 years on the city council. Then he ran for the Board of Supervisors for Riverside County. “I was the board appointee to the county hospital, which was struggling,” he says, recalling one of his proudest accomplishments. “With my leadership, I was able to help turn that hospital around into a profit-making entity that expanded clinical pharmacy programming and saw pharmacists doing rotations with physicians.”

In 2014, he won office in newly redrawn state senate district 28. (The only election he has lost to date was a bid for California’s 36th congressional district in 2016.) The 28th district extends from southwest Riverside County to the Arizona border, including Temecula, Murrieta, Lake Elsinore and Palm Springs.

He prides himself on bipartisan efforts to benefit patients. He teamed with a Democrat, Hannah-Beth Jackson of Santa Barbara, to co-author a drug takeback bill that went into effect in 2016. The legislation allows people to drop off unused pharmaceuticals in specially designed storage containers. He also has co-authored laws that make it tougher for juveniles to buy tobacco products.

Over the long term, Stone expects a “monumental shift” in pharmacists’ ability to bill for clinical care services. But just as politicians must work across the aisle to be truly effective, he knows that expanding pharmacists’ range will support fellow healthcare providers rather than usurp anyone’s role.

“In no way has this ever been about thinking we’re the superheroes of the medical profession who can solve everything by ourselves,” he says. “But we bring a certain expertise to the table that complements that of other healthcare professionals. The goal for all of us is to work collaboratively in the best interest of the patient and to deliver better healthcare.”

As Stone continues working on legislation promoting healthcare and other priorities, he remains true to his roots. “I’m a pharmacist first, politician second,” he says. “If I had a choice of being one or the other, I would have stayed a pharmacist.”

California State Senator Jeff Stone, PharmD ’81, is one of only five medical professionals — and the only pharmacist — in the California state legislature.
USC School of Pharmacy students explored the globe over the summer as they pursued internships and rotations in far-flung destinations from Australia to Europe and Asia to Africa, as well as across the United States. Follow them on their journey pursuing new knowledge and skills as well as the opportunity to explore new locales.

What I Did This Summer

- **Alanah Bell,** PharmD Class of 2019

  Seattle is my hometown, so being back in the city for rotations this summer was incredible. While I worked hard, I was still able to spend time with friends and family and enjoy the beautiful scenery.

- **Marineh Malek,** PharmD Class of 2021, studied in Queensland, Australia.

  I gained invaluable experience working in the Wesley Pharmacy in Brisbane while getting to experience some of this beautiful country.

- **Marl Ayson,** PharmD Class of 2019, spent his summer in Alaska.

  As an individual who enjoys the outdoors, having the opportunity to choose a rotation in Alaska was a blessing.

- **Audrey Leung,** PharmD Class of 2019, along with classmate **Sara Strobel-Sabatino,** completed a five-week rotation at Trinity College in Dublin.

  During our first week in Dublin, we rotated through an independent community pharmacy where we learned about Ireland’s healthcare system and pharmacy operations. We rotated through multiple pharmacies in Dublin and also assisted Trinity College pharmacy students with their rotation placements.
We thoroughly enjoyed our global pharmacy experience in Toyama and were warmly welcomed by the Japanese students and faculty. The students taught us how to wrap sushi and make yummy okonomiyaki. We went to Tateyama mountain and saw the famous snow wall, which was 13 meters high that day!.

Growing up in Ghana, I witnessed cases of malaria, tuberculosis, diarrhea and HIV/AIDS, among many other diseases that are still prevalent in Africa today. It was rewarding to return home and provide care to those in need.

We both loved our experience in Seoul!

We thoroughly enjoyed our global pharmacy experience in Toyama and were warmly welcomed by the Japanese students and faculty. The students taught us how to wrap sushi and make yummy okonomiyaki. We went to Tateyama mountain and saw the famous snow wall, which was 13 meters high that day!
From the game-changing purchase of PillPack by Amazon to increasingly personalized treatments for disease — and from fundamental changes to the Affordable Care Act to the ever-increasing role of the pharmacist in clinical care — massive changes are both driving and being driven by the pharmacy field. We asked USC School of Pharmacy faculty, students, alumni and friends to share their vision for what the field of pharmacy, and the school itself, might look like in the next decade.
The field of pharmacy and the school in particular need to fully harness the capacity of big data — not only to improve the quality of care for patients, but also to fuel the discovery of new drugs for a host of conditions. Advances in genomics and precision medicine enable therapy that is customized like a fingerprint to an individual’s unique genetic makeup and disease state.”

**Vassilios Papadopoulos**  
Dean, USC School of Pharmacy  
John Stauffer Dean’s Chair in Pharmaceutical Sciences

I foresee continued expansion of immunotherapy and targeted drug delivery such as chimeric antigen receptor T-cell (CAR T-cell) therapy. CAR T-cell therapy removes immune cells — T cells — from a patient, genetically engineers them to kill cancer cells and then puts them back in the body. The treatment already is approved by the Food and Drug Administration for some cancers, including acute lymphoblastic leukemia and adult lymphoma.”

**Daryl Davies**  
Professor, Titus Family Department of Clinical Pharmacy  
Director, MS in Management of Drug Development

The integration of pharmacy and engineering will drive future advances in drug delivery and targeting. The combination of high throughput technologies, such as sequencing and imaging mass spectrometry, will provide unprecedented details on ‘omics’ information — on the genomes, transcriptomes, proteomes, lipidomes and metabolomes — directly from cells, tissues and whole organs, allowing for global monitoring of molecular signatures that reflect real-time physiological and pathological states in health and disease. This will accelerate and transform the discovery of biomarkers for early diagnosis, accurate prognostic staging and prediction of treatment response as well as identification of novel targets for developing effective treatment options.”

**Annie Wong-Beringer**  
Associate Dean, Research and Graduate Education

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**Jacque J. Sokolov, MD**  
Chairman and CEO, SSB Solutions, and Member, USC School of Pharmacy Board of Councilors

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**I see tremendous growth in complex therapies, including biologics/biosimilars, oncology immunotherapies — neoepitopes and combination therapies of multiple different complex interventions. I see the clinical role of pharmacists expanding with these more complex therapeutic interventions.”**
Advances in Information technology will yield quicker, more precise diagnoses, as well as constant monitoring and follow-up. This will help patients better understand and manage their health, and reorient health services from curative to preventive care. Such changes should position pharmacists to play an increasingly important role in healthcare delivery.

**Geoffrey Joyce**  
Associate Professor and Chair, Department of Pharmaceutical and Health Economics

“The infrastructure of our healthcare system will evolve to allow pharmacists to more readily bill for cognitive services, further validating the role of the pharmacist clinician. Patient care programs will continue to grow in the community setting, and the distinction between ‘clinical’ pharmacists and dispensing pharmacists will disappear.”

**Melissa Durham**  
Assistant Professor, Titus Family Department of Clinical Pharmacy

Over the next decade, I expect to see the expansion of the pharmacists’ prescriptive authority on a national level. This would support the pharmacists’ ability to manage drug therapy across a variety of disease states and practice settings.”

**Richard Dang**  
Assistant Professor, Titus Family Department of Clinical Pharmacy  
Director, Student Outreach and Community Health

I anticipate an increased range of services coming within the pharmacists’ realm, such as telehealth services with 24/7 on-call pharmacists for patient consultation and psychiatric pharmacy stewardship to address co-morbidities of depression and physical disorders — which exponentially increase healthcare costs.”

**DanQuynh Bui, PharmD Class of 2021**
I see an explosion of increased value-based care, which is the juxtaposition of clinical metrics with financial incentives that increase reimbursement based on improved population health. In addition, clinical team-based care will significantly change the roles of MDs, pharmacists, nurse practitioners, nurses, etc. Finally, there are increasing sub-populations such as elderly Medicare patients that require adjusted clinical models / interventions that shout ‘meet the patient where they are.’

Jacque J. Sokolov, MD
Chairman and CEO, SSB Solutions, and Member, USC School of Pharmacy Board of Councilors

Advances in remote patient monitoring and artificial intelligence are poised to disrupt disease management and clinical pharmacy practice. We are going to see more and more AI and automation in an attempt to improve population health. Pharmacists should be early adopters of new technology to innovate the field of clinical pharmacy practice and improve patient outcomes.

Daniel Kudryashov, PharmD ’15
Transitions of Care and Pharmacy Student Experiential Program Coordinator, Keck Medicine of USC

Technological advances in prescription filling will enable community-based pharmacists to spend more time on working with patients and collaborating with health systems to optimize medication therapy. Re-engineering of workflow, advancing the roles of pharmacy technicians as clinical support personnel and video telehealth will also help make comprehensive medication management services more efficient and available.

Steven Chen, PharmD ’89
Associate Dean, Clinical Affairs William A. and Josephine A. Heeres Chair in Community Pharmacy

Pharmacists will increase their ability to provide care to patients in the community by giving injections and travel consultations, monitoring patients for adverse effects and having the ability to prescribe and monitor — in collaboration with the physician — chronic medication therapy for hypertension, anticoagulant therapy, birth control and other therapies.

Judy Flesh Rosenberg, PharmD ’75
Member, USC School of Pharmacy Board of Councilors
Nonprofit Consultant

Pharmacists will be needed more than ever in the new era of technological advancements in pharmacy delivery services. A robot cannot replace human interaction and knowledge. Pharmacy is a people-centered profession, and our expertise is needed in the various communities we serve.

Whitney Y. Fakolade, PharmD
Class of 2021

The role of pharmacists will continue to evolve, giving pharmacists more independent authority as the physician shortage continues.

Jean Pallares, PharmD ’84
Chief Pharmacy Officer, Los Angeles County Department of Health Services
I think the future of pharmaceutical practice will move toward a more global and innovative perspective. I think we as future pharmacists should contribute to building a better relationship among countries and building more trust for the benefit of our patients.”

Shuya (Iris) Zhang, PharmD
Class of 2021

The Food and Drug Administration [FDA] and its global counterparts have each maintained a national focus for many years. The result is that we have to introduce products in multiple countries, all of which have different laws, rules and regulations. The FDA already is working on better coordination with other countries, and I expect to see that grow so we can eliminate the bureaucratic aspects that slow down approvals while improving international quality standards. I also hope, and expect, to see a growing appreciation for the value of regulatory science training.”

Frances Richmond
Chair, Department of Regulatory and Quality Sciences

I think we will see an explosion in the number of companion diagnostic devices coming onto the market. As a result, I expect to see a continued improvement in safety and efficacy of therapeutics. Healthcare professionals may be able to tailor dosing to best suit patients and/or effectively identify ‘responders.’ We are continually inching towards widespread personalized medicine becoming a reality, which is undeniably exciting.”

Jordanna Jayne
PhD Candidate, Clinical and Experimental Therapeutics, and MS Candidate, Regulatory Science, Class of 2019

The pharmacy profession will need to embrace the next wave of healthcare innovation to drive markets and improve patient access, through the integration of performance analytics into novel treatment value and outcomes measures.”

Grant D. Lawless
Associate Professor
Program Director, Healthcare Decision Analysis

Regulatory scientists will be charged with developing safeguards for international application to ensure that biomedical products reach the patients who need them — no matter where they live.”

Eunjoo Pacifici
Assistant Professor
Director, International Center for Regulatory Science
We live in an era in which technology is driving the questions in biology and medicine rather than the other way around. All this happens at such a great speed that we have difficulty comprehending, following, adjusting and even developing metrics to assess outcomes and policies to implement changes. These changes are part of a more complicated ecosystem in which economic impact intertwines with discovery and practices.

Vassilios Papadopoulos  
Dean, USC School of Pharmacy  
John Stauffer Dean’s Chair in Pharmaceutical Sciences

I think there is going to be a monumental shift in the scope of what pharmacists will be allowed to do, and bill for, in terms of patient care. If you work more on prevention, at the front end, you’re going to save a lot of money on the back end. Pharmacists also can contribute to decreasing the morbidity and mortality associated with chronic disease, helping improve the quality of life for patients.

Jeff Stone, PharmD ’81  
California State Senator

The future of pharmacy must be driven by value. Instead of worrying about short-term costs, we must reward innovation that brings long-term benefits through healthier lives and patient-centered care.

Darius Lakdawalla  
Quintiles Chair in Pharmaceutical Development and Regulatory Innovation  
Director of Research, USC Schaeffer Center for Health Policy & Economics
 USC pharmacy students work hard to achieve their dreams of becoming leaders in the profession. To expand on-campus spaces designed to help them thrive, the USC School of Pharmacy is developing an inviting and vibrant home for the Margaret and John Biles Leadership Center.

By refurbishing — and reimagining — Seaver Hall, the building adjacent to the USC School of Pharmacy’s John Stauffer Pharmaceutical Sciences Center, the school is creating a student-centric and technologically up-to-date facility for programs, services and events. The center’s design, which has involved students since the earliest planning stages, will include breakout areas to encourage meetings and collaboration.

The Biles Leadership Center in Seaver Hall will focus on students and student services with:

> A new student activity room with a large-screen TV, quiet study lounge and flexible-use space
> New offices for Admissions and Financial Aid, Career Counseling and Student Affairs
> Major upgrades to electrical and network infrastructure that will facilitate more collaborative and technology-enabled learning

The renovation project will free up space for faculty and research laboratories in the Center for Health Professions Building, allowing the school to continue its overall expansion.

The center is named for visionary pharmacy leader John Biles, and his wife, Margaret. Biles first joined the USC School of Pharmacy as an assistant professor in 1952, eventually serving the school as dean from 1968 to 1995.

An energetic advocate for the field of pharmacy, he was heralded nationwide for his efforts to transform the profession from a dispenser of medicines to an active clinical role with responsibility for optimizing therapeutic outcomes. Under his guidance, the school became the first in the nation to offer students clinical clerkships modeled after those in medical schools, which have since become a foundational part of pharmacy education throughout the country — just one of many firsts under his leadership.

“When my father passed away, the number of students who wrote personal letters to say what he had meant to them was overwhelming,” says his daughter, Paula Murphy. “Both my parents invested a lot of years into USC. My mother is so thrilled with this honor, and I know my father would be, too.”

“He was focused on our students in every possible way,” says Professor Mel Baron, who studied under Biles at USC before making his own mark on the profession and at the school. “We in pharmacy are indebted to all of the things that he contributed to advance our profession, and we look forward to continuing to develop this leadership center in his name and Margaret’s.”

The Biles Leadership Center brings together representatives from constituencies involved in healthcare — providers, payers, policymakers — through annual conferences and speaker series that address pressing health-related concerns, providing invaluable learning and networking opportunities for pharmacy trainees.

The Biles Leadership Center was created through a generous gift from Ninetta and Gavin Herbert.
CONTINUING A LEGACY OF SUPPORT FOR JUNIOR FACULTY

The late Kathleen Johnson, PharmD ’78, was committed to nurturing emerging leaders in the field. Now, the USC School of Pharmacy is paying tribute to her memory through creation of a fund to foster promising new research and support professional development for early-career faculty.

Johnson passed away in 2012 after serving the school for 28 years, first as an assistant professor and eventually vice dean of clinical affairs and outcomes sciences, chair of the Titus Family Department of Clinical Pharmacy, and the William A. and Josephine A. Heeres Chair in Community Pharmacy.

A dedicated teacher, Johnson mentored PharmD candidates as well as master’s and doctoral students in public health and epidemiology and in pharmaceutical economics and policy. She always encouraged students and young faculty to follow their professional passions and broaden their horizons about what pharmacy can accomplish—not just in improving lives but also in bettering the world.

“Kathy was always looking for a way to connect people with opportunity—so that each individual could advance and grow, but also because she knew the person she was connecting would do the same for others,” says Wynnsan Moore, Johnson’s husband. “She would be immensely proud that among her legacies at the school is an endowment that supports the professional growth of young faculty.”

A Fund to Fuel the Future

The USC School of Pharmacy has announced the Dean’s Innovation Fund, an initiative designed to encourage bold projects in research, clinical practice and education.

The aim is to build upon the school’s long history of innovation and foster such projects as early-stage, higher-risk laboratory investigations that have potential for great impact but often have difficulty garnering backing from government and other external sources. The fund also may be used to develop advanced facilities and purchase equipment to fuel such initiatives, as well as to bolster unique educational opportunities for enhancing the student experience.

“Our goal is to build a substantial endowment for the fund so that the innovators on our faculty, as well as those we mentor, can seize all opportunities to turn their big ideas into reality in shaping the future of pharmacy,” Dean Vassilios Papadopoulos says.

For information about all of these initiatives, contact Cheryl Stanovich at stanovic@usc.edu or 323-442-1738.
2018 ALUMNIawards Celebration

The second annual USC School of Pharmacy Alumni Awards Gala recognized eight exceptional leaders for their contributions to the pharmacy profession.

After a performance by the Trojan Marching Band and a welcome from Dean Vassilios Papadopoulos, the awardees each had a chance to give brief remarks before a packed house at Town & Gown on April 29.

The Honorees Were:

Irv Sitkoff, PharmD ’54
Distinguished Alumni Award
Pharmacist, Eisner Pediatric and Family Pharmacy

Craig Cheetham, PharmD ’78,
MS Pharmacoeconomics and Policy ’97
Innovation and Pharmacoeconomics Award
Research Professor, Western University Health Sciences College of Pharmacy

Susan McCune, MD, certificate in Regulatory Science
Innovation in Regulatory Science Award
Director, Office of Pediatric Therapeutics, U.S. Food and Drug Administration

Gustavus A. Aranda Jr., PharmD ’04,
MS Pharmaceutical Economics and Policy ’06
Young Alumni Award
Senior Manager, Clinical Science and Outcomes, Takeda Pharmaceuticals North America Inc.

Lisa Gunther Lum, PharmD ’86
Community Service Award
Medication Safety Officer, Adventist Health Glendale

Dong Koo (D.K.) Kim
Dean’s Medallion Award
Founder, D.K. Kim Foundation

Shushma Patel, MBA, RPh
Honorary Alumni Award
Owner, Aspire Rx

Jason (Jiansheng) Wan, PhD Pharmaceutical Sciences ’91
Research Achievement Award
Founder and CEO, Sinotherapeutics

Top (from left): Honorees Jason (Jiansheng) Wan, Dong Koo (D.K.) Kim, Gustavus A. Aranda Jr., Shushma Patel, Lisa Gunther Lum, Craig Cheetham and Irv Sitkoff with Dean Vassilios Papadopoulos.

Bottom: A group of students received the inaugural Inspire Awards in recognition of exemplary leadership and service. Pictured (from left): Sandy On (PharmD), Craig Luis (PharmD), Jeremy Dow (PharmD), Amanda Chron (PharmD)/Pharmaceutical Sciences), Eric Lee (Regulatory Science), Adam Roeder (Health Care Decision Analysis), Larry Rodriguez (Pharmaceutical Sciences). Not pictured: Si Xuan (Health Economics).
Alumni Advocates

Established in 1958, QSAD Centurion is the USC School of Pharmacy’s premier support group. Its board of alumni leaders advocates on behalf of the school, and engages fellow graduates and others within the healthcare community in the school’s work. The board also plays a vital role in the $100 million Boldly First fundraising campaign, helping advance priorities such as increasing support for student scholarships, the Biles Leadership Center, the Kathleen Johnson Fund, the Dean’s Innovation Fund and campus entrepreneurship by launching the inaugural Student Innovation “Shark Tank” competition in academic year 2019.

QSAD is an abbreviation of the Latin inscription formerly written on most prescriptions, “quantum sufficit ad” — as much as is sufficient. This ancient phrase inspired the mission of QSAD Centurion — to contribute sufficient funds to make a difference between an adequate education and a great one.

MEET THE CURRENT QSAD CENTURION BOARD

Khanh-Long (Ken) Thai, PharmD ‘02
Board Chair, CEO
986 Pharmacy

John Bruce, PharmD ’70
President/CEO
Western States Pharmacy Coalition

Jesse Hong, PharmD/MBA ’92
Associate Director, IDNs and Emerging Customers
Purdue Pharma LP

Kevin Ibaraki, PharmD ’85
Executive Director, Field Medical Affairs
Syneos Health

Karina Keshishian, PharmD ’92
Owner
Medex Pharmacies

Charles Leiter, PharmD ’83
Principal Consultant
Charles Leiter LLC

Ricky Ma, PharmD ’95
Owner
Community Medical Pharmacy

David Makhani, PharmD ’87
Owner
MDR Pharmaceutical Care

David Truong, PharmD ’07
Associate Director, Regulatory Affairs
Teva Pharmaceuticals

Words of Wisdom

Eileen Goodis Strom, PharmD ’77, served as the featured speaker at the school’s commencement ceremony in May. She shared experiences and lessons learned from her career as a healthcare entrepreneur, during which she founded and then sold two pharmacy businesses.

“Get comfortable being uncomfortable — it’s a gift,” she told the graduates, emphasizing the importance of building relationships, taking risks and remembering the power of words to inspire.

As president and CEO of Home Pharmacy of California, she built an industry-leading regional pharmacy company that provided infusion, nutritional, and specialty medication and services to patients in their homes. She led the company through major changes, concluding with a strategic acquisition by Walgreens Health Services. She also founded Patient Care Pharmacy, which provided comprehensive pharmacy services to long-term-care facilities, and orchestrated a strategic sale to Integrated Health Services, a public company that owned a national chain of subacute hospitals.

Goodis Strom serves on the school’s Board of Councilors, which she previously chaired, and is an adjunct professor of clinical pharmacy.

Larry and Wandy Jung, both PharmD ’77 (center), won the 2018 Service Award from the USC Asian Pacific Alumni Association. They were honored along with Sabrina Kay (left), chancellor of Fremont College and CEO of Fremont Private Investments, and Jon Soo Hoo, official photographer of the Los Angeles Dodgers.
We want to hear from you! Email your updates and career news to pharmcom@usc.edu to be included in the next edition of Class Notes.

1960s

Richard Fond, PharmD ’65, owned and operated the Glenoaks Rx Pharmacy in Burbank, Calif., from 1972 until its sale in 2006. He is enjoying retirement with his wife, Marji, in Sherman Oaks, Calif., and stays busy by playing softball, traveling the country attending plays and writing commentary on current events.

John Bruce, PharmD ’70, is president and CEO of Western States Pharmacy Coalition.

James Roache, PharmD ’70, is newly retired after selling his firm, Advanced Pharmacy and Respiratory Care Solutions in Laguna Hills, Calif., to Samuel K. Lee, PharmD ’12.

Craig Stern, PharmD ’76, is president of Pro Pharma Pharmaceutical Consultants Inc.

Ira Poltorak, PharmD ’80, is chief operating officer of Comprehensive Pharmacy Services.

Wanda Shimazu, PharmD ’81, is a floater pharmacist for Costco Wholesale.

1970s

Mark Burstyn, PharmD ’84, is the owner of Amber Home Solutions, a real estate investment company in the San Gabriel Valley.

Lisa Lum, PharmD ’86, a medication safety officer at Adventist Health Glendale, was elected to a second term as president of the California Society of Health-System Pharmacists (CSHP) Foundation and as a member of its board of directors through 2021.

Alan Kamada, PharmD ’88, is senior medical information scientist at United Therapeutics Corp. in North Carolina.

William Tang, PharmD ’91, is a pharmacist at Children’s Hospital Los Angeles.

Shiva Farzan, PharmD ’92, is head pharmacist at Astro Pharmacy in Glendale, Calif.

Jennifer Yoon, PharmD ’93, is an assistant director of pharmacy at the Santa Clara Valley Health and Hospital System.

Jenny Bui, PharmD ’94, is a regional healthcare leader at Rite Aid.

Wilbert Ho, PharmD ’95, is a pharmacy supervisor at Los Angeles County-USC Medical Center.

Claudia Espinoza, PharmD ’97, is national sales manager at Natura’s Foods of California.

Carol Choi, PharmD ’99, is a clinical pharmacist at St. Joseph Health in Fullerton, Calif.

Karen Goud, PharmD ’99, is the owner of a photography business.

Jennefer Hagemann, MS Regulatory Science ’09, is a clinical research associate at Puma Biotechnology.

Sofia Gezalyan, PharmD ’06, is director of inpatient pharmacy services at CHA Hollywood Presbyterian Medical Center.

Sarica Klein, PharmD ’06, is a medical science liaison at Sanofi Genzyme.

Diem Tom, PharmD ’06, is a clinical account manager at Cigna.

Jennifer Hagemann, MS Regulatory Science ’09, is a clinical research associate at Puma Biotechnology.

Carolyn Quon, PharmD ’00, is senior director of medical communications at Dohmen Life Science Services.

Komal Patel, PharmD ’00, is a clinical pharmacist with Catalia Health.

Jennifer Polzin, PharmD ’00, is a pharmacy strategic provider at Premera Blue Cross.

Carolyn Quon, PharmD ’00, is senior director of medical communications at Dohmen Life Science Services.

2000s

Kwabena Asabere, PharmD ’02, is a pharmacist at CVS Pharmacy.

Jerika Lam, PharmD ’03, was elected a member of the CSHP Foundation board of directors through 2019 and is an associate professor at the Chapman University School of Pharmacy.

Sofia Gezalyan, PharmD ’06, is director of inpatient pharmacy services at CHA Hollywood Presbyterian Medical Center.

Sarica Klein, PharmD ’06, is a medical science liaison at Sanofi Genzyme.

Diem Tom, PharmD ’06, is a clinical account manager at Cigna.
Connie Hernandez, MS Regulatory Science ’10, is an executive clinical research associate at IQVIA.

Elina Baskina, PharmD ’11, is director of specialty pharmacy at Keck Medicine of USC Specialty Pharmacy.

Nicole Hsu, MS Regulatory Science ’12, is associate director of regulatory affairs at Atara Biotherapeutics.

Kristina Miricanyan, PharmD ’12, is an inpatient pharmacist at Kaiser Permanente.

Eunice Rhee, PharmD ’12, is ambulatory infusion pharmacy manager at Keck Medicine of USC.

Yang Li, MS Regulatory Science ’14, is co-founder of Accurate & Precise Pharmaceuticals and COO of Advanced Analytical Testing Service.

Andrea Simon, PharmD ’15, is a clinical pharmacist and lead antimicrobial stewardship pharmacist at Dignity Health Northridge Hospital Medical Center.

Heidi Chung, PharmD ’16, is a medical science liaison at Allergan.

Chris Farina, MS Management of Drug Development ’16, is vice president of operations at CardioVax.

Rachelle Kim, PharmD ’17, is a field reimbursement manager at CareMetx.

IN MEMORIAM

Hudson Henry Smith Jr.
OCTOBER 23, 1941—JANUARY 1, 2018

Born in Chattanooga, Tenn., and raised in Los Angeles, Hudson H. Smith Jr. earned his undergraduate and PharmD degrees at USC, graduating as a Doctor of Pharmacy in 1965. Smith worked as a pharmacist at a Thrifty Drugs on Figueroa and Vernon in Los Angeles before co-founding Parkview Pharmacy in 1966 as a community business that emphasized respectful and compassionate customer care, often using traditional remedies. Many young members of the community had their first jobs at Parkview Pharmacy and found a caring mentor in Smith. Smith continued to work at Parkview Pharmacy until a few months before he passed away. From the mural of African-American icons on the outer walls to the meticulously kept shelves and personal attention to customers, Parkview Pharmacy at 95th and Main (and the many lives it continues to touch) is testament to Smith’s life of service to the community.

IN MEMORIAM

Alan Forrest
1952—AUGUST 25, 2018

An expert in pharmacokinetic and pharmacodynamics modeling, Alan Forrest, PharmD ’79, was a clinical professor at the University of North Carolina (UNC) Eshelman School of Pharmacy.

Forrest’s landmark research linking ciprofloxacin exposures to clinical response in critically ill patients revolutionized antimicrobial drug development, leading pharmaceutical companies to regularly conduct exposure response analyses for antimicrobials. In 2016, the International Society of Pharmacometrics honored him with its Lewis B. Sheiner Lecture Award.

After earning his PharmD at USC, he remained at the university as a postgraduate research scholar in clinical pharmacology and a pharmacy resident in clinical pharmacokinetics. He also served as senior director of Pharmacometrics at the Institute for Clinical Pharmacodynamics and as an expert advisor to the Food and Drug Administration.
Clawbacks describe patient co-payments that exceed a drug’s full cost to insurers or pharmacy benefit managers. New research at the USC School of Pharmacy and the USC Schaeffer Center for Health Policy & Economics reveals how heavily they are digging into consumers’ pockets.

The study, published in *JAMA: The Journal of the American Medical Association*, analyzed the prices paid by 1.6 million people for 9.5 million prescriptions in the first half of 2013. The researchers found that customers would be better off paying directly 23 percent of the time and would save an average of $7.69 per prescription by not going through insurance.

“Clearly this is going on at a much higher frequency than most people imagine,” says study co-author Geoffrey Joyce, chair of the Department of Pharmaceutical and Health Economics at the School of Pharmacy and director of health policy at the Schaeffer Center. “You’re penalizing people for having insurance.”
Cadenas Earns Three International Accolades

Enrique Cadenas can now add being an officer of France’s National Order of Merit to his extensive list of honors. He received the award in recognition of contributions and service to science, international cooperation and, of course, France. Also honored with the title — one of that country’s highest accolades — was Professor Kelvin J. A. Davies of the USC Leonard Davis School of Gerontology.

Cadenas, the Charles Krown/Alumni Professor in Pharmaceutical Sciences at the USC School of Pharmacy, is a leading investigator of the role played by mitochondrion-centered processes in Alzheimer’s and other neurodegenerative diseases. Working with Davies, he has engaged in ongoing research collaborations with distinguished French colleagues and organized several international scientific conferences in France and the U.S. on the biological causes of aging and age-related diseases.

The honor actually represents an upgrade, as France named Cadenas and Davies knights of the National Order of Merit in 2012. French President Charles de Gaulle established the order in 1963 to laud work that has societal significance beyond a recipient’s own field. New honorees are named knights and can ascend to higher ranks as new merits are established — as Cadenas and Davies have done.

“I have had opportunities to partner with some extraordinary researchers and institutions around the world on work that has been highly productive and deeply rewarding,” Cadenas says. “To be honored for that work is icing on the cake. I am grateful to my colleagues, for the support of USC School of Pharmacy Dean Vassilios Papadopoulos and for the continued connection between our two nations.”

Shih Inducted into National Academy of Inventors

University Professor Jean Chen Shih was among 23 USC inventors inducted into the USC Chapter of the National Academy of Inventors (NAI) in April. USC-NAI is one of 46 NAI chapters nationwide, and among the largest. Shih joins previously inducted USC School of Pharmacy colleagues Liana Asatryan, Roberta Diaz Brinton, Daryl Davies, Stan Louie, J. Andrew MacKay, Dean Vassilios Papadopoulos, Frances Richmond, Kathleen Rodgers, Wei-Chiang Shen and Yong (Tiger) Zhang.

KEY EXCHANGE

The 2018 California Pharmacists Association (CPhA) Western Pharmacy Exchange featured plaudits for USC School of Pharmacy professors and presentations on which students collaborated with faculty.

Melissa J. Durham, assistant professor of clinical pharmacy, was honored as the 2018 Cardinal Health Generation Rx Champion. She also delivered the event’s keynote address, “Stuck in the Middle: Pharmacists and the Opioid Crisis.”

Richard H. Dang, assistant professor of clinical pharmacy and director of Student Outreach and Community Engagement, earned the 2018 CPhA Distinguished New Practitioner award. In addition, he took part in presentations covering smoking cessation, tips on successful comprehensive medication reviews, pharmacy-based medical clinics and career paths for residency program graduates.

The occasion also acknowledged the career achievements of Bradley R. Williams and Mel Baron, both professors of clinical pharmacy. Williams was inducted into the CPhA Hall of Fame. Baron was honored as a CPhA Life Member.
**Faculty Appointments**

**Jiang Liang**, MD, PhD, has been named a research professor of clinical pharmacy. She has more than 25 years of experience in drug development — from exploring compounds to developing clinical trials. She received her medical degree and PhD at Tokyo University Medical School before moving to the U.S. in 1999. Prior to joining USC, she was a principal investigator and collaborator of Distinguished Professor Richard Olsen at UCLA, studying alcohol-use disorder. Her work in the field holds the potential for new treatments for Alzheimer’s, Parkinson’s, post-traumatic stress disorder and anxiety. See related story on page 4.

**Zhipeng Lu**, PhD, is an assistant professor of pharmacology and pharmaceutical sciences. He earned his doctorate in biology at the University of North Carolina, focusing on novel RNA-protein interactions and new forms of circular RNAs, then completed postdoctoral training at Stanford University. His work on noncoding RNA structures led to the discovery of a drug target that has been employed to develop drugs to treat X-linked genetic diseases. His work was featured on the cover of Cell in 2016. Lu’s honors include the National Institutes of Health Pathway to Independence Award.

**Scott Mosley**, PharmD, has been appointed an assistant professor of clinical pharmacy. His research focuses on pharmacogenomics implementation, which incorporates genetic information with other clinical factors to optimize drug selection. He recently completed a postdoctoral research fellowship at the University of Florida College of Pharmacy in the Center for Pharmacogenomics.

**Klaus Romero**, MD, has joined the faculty as an adjunct professor of clinical pharmacy. An accomplished clinical scientist with an international reputation in pharmacometrics, he will help lead the development of a sophisticated data management and analytics core for the school, integrating research data within USC and from external collaborators and then developing longitudinal models. This work also will provide unique training opportunities for students. He has authored more than 40 peer-reviewed publications and served as a co-investigator on several National Institutes of Health, Food and Drug Administration, and foundation grants.

**Maryann Wu**, EdD, has been named an assistant professor of clinical pharmacy. Since joining the staff of the USC School of Pharmacy in 2016, she has played a key role in building the PharmD assessment program, implementing the new PharmD curriculum and ensuring the school continues to uphold all standards required by the Accreditation Council for Pharmacy Education. She previously served in various academic programming and advising roles at the USC Annenberg School for Communication and Journalism and the USC Rossier School of Education. She received her master’s degree in higher education and student affairs from The Ohio State University and her doctorate in educational leadership from USC Rossier.
Faculty Retirements

1 Brad Williams, professor of clinical pharmacy and clinical gerontology, is retiring after 40 years at USC. He earned his PharmD at USC in 1977 and then completed a residency in geriatrics at USC before joining the faculty in 1979. A board-certified geriatric pharmacist, his responsibilities included a geriatrics clinical clerkship, teaching an elective in geriatric pharmacy practice and directing the joint PharmD/master of science in gerontology, offered in partnership with the USC Davis School of Gerontology. He is a founding member and past chair of the Commission for Certification in Geriatric Pharmacy and a past member of the board of the California Geriatrics Society. He is a chapter author for Applied Therapeutics: The Clinical Use of Drugs and a member of the editorial board for The Consultant Pharmacist.

2 Florence Wong joined the USC School of Pharmacy in 2003 as an assistant professor of clinical pharmacy. During her tenure, she also served as acute care pharmacy manager at USC Norris Cancer Hospital and Keck Hospital of USC. In addition, she was a research assistant in the department of Microbiology and Genetics at USC from 1982 to 1983. Before coming to USC, she was director of pharmacy at Owen Healthcare Inc. at Pacific Alliance Medical Center in Los Angeles. Before that, she served as a clinical pharmacy resident at the Veterans Administration Medical Center in Long Beach, Calif. Wong earned her PharmD at the University of California, San Francisco, and her BA in biological sciences at USC.

Understanding FDA Regulations

An Overview of FDA Regulated Products: From Drugs and Medical Devices to Food and Tobacco provides guidance on how to interpret and apply complicated regulatory information. Co-edited by Eunjoo Pacifi, PharmD ’88, PhD ’92 — director of the International Center for Regulatory Science at the USC School of Pharmacy — the book is designed to provide a competitive advantage to both newcomers and established regulatory science professionals. Concise and easy to read with practical explanations, key points, summaries and case studies, the publication highlights the regulatory processes involved in bringing a Food and Drug Administration-regulated product from research and development to approval and market. Although the primary focus is on the U.S. system, it also features global perspectives.

ISPOR Honors Myerson

Rebecca Myerson, an assistant professor in the Department of Pharmaceutical and Health Economics, garnered the 2018 ISPOR Health Economics and Outcomes Research Application Award at the ISPOR Annual International Meeting in Baltimore.

She led research comparing health outcomes in New York counties that banned trans fatty acids to similar counties without such prohibitions. For the study, published in JAMA Cardiology, she and her co-authors adjusted for commutes between restricted and nonrestricted counties, which accounted for people who eat near their place of work. Myerson oversaw design of the study and conducted the analysis.

The findings revealed that counties with restrictions experienced an additional 6.2 percent decline in hospital admissions for heart attack and stroke for three or more years after implementation, compared to those placing no limits on trans fats. This translates to 43 fewer heart attacks and strokes per 100,000 people.

The study, which attracted national attention, came at a pivotal time. In 2015, the Food and Drug Administration determined trans fats were no longer “generally recognized as safe” in processed foods and, effective in 2018, restrictions on industrially made trans fatty acids were implemented across the United States.
School of Pharmacy Salutes the Graduating Class of 2018

At the school’s 111th commencement ceremony in May, Dean Vassilios Papadopoulos advised the Class of 2018 — the new pharmacists, pharmacologists, pharmaceutical scientists, health economists and regulatory experts — to always have a purpose beyond position and money that will guide them through life, and to never forget their connection to USC.

“The Trojan Family is proud of you,” he told the graduates. “Each one of you has a remarkable story. You have used your time at USC to do incredible things.”

Speaking on behalf of her peers was Irene Chen, president of the PharmD class, who shared her personal journey through a series of health crises both before and during pharmacy school, and encouraged the graduates to remember that it is a privilege to serve others.

“We are in a unique position as healthcare providers,” Chen told her classmates. “Our patients are the best teachers. In a world where you can be anything, be kind.”

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**2018 COMMENCEMENT**

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<th>185</th>
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<td>7</td>
<td>PhDs in Pharmaceutical Sciences</td>
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<td>Doctors of Regulatory Science</td>
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<td>MS in Regulatory Science</td>
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Tianhua Gu, PharmD ’18, received the Student Service Award.

Jordan Despanie, PhD ’18, Pharmaceutical Sciences, won the Dean’s Innovation Award.

Mnawabisi Mbangata, PharmD ’18, celebrates with classmates at the commencement ceremony.
ENDLESS POTENTIAL

At the 2018 commencement ceremony, Renita Moradian, BS ’18, accepted the school’s first bachelor of science in pharmacology and drug development. Here, she shares what drew her to the program as well as her plans for the future.

What attracted you to the field of pharmacy?

It allows you to pursue multiple career paths, including many opportunities for those who love patient interaction and want to work alongside other healthcare professionals in clinical settings — or for those interested in research and drug development in pioneering biopharmaceutical fields. The idea of combining my love for science with creativity in a biopharmaceutical field is something I am passionate about.

Why did you decide to major in Pharmacology and Drug Development?

The major comprises courses that are academically intriguing and professionally applicable within the current healthcare and pharmaceutical industries. After meeting with many USC School of Pharmacy faculty members, I understood the benefit of taking these courses as an undergraduate. I realized that these classes would better prepare me for pharmacy school while also giving me the best chance for future success. Through the program, I met several inspiring mentors.

What are your career aspirations?

As of now, my goal is to get accepted to a pharmacy school for fall 2019. I’m taking an extra semester before applying to give myself time to better figure out what I want to do within the field of pharmacy. Due to the endless opportunities, I constantly find myself torn between wanting to work for a biopharmaceutical company or in clinical pharmacy.

How does it feel to be the first undergraduate in decades to receive a degree from the USC School of Pharmacy?

I truly feel honored. Every person I have met in this program has been welcoming, encouraging and, most importantly, inspiring. Through people like Dr. Daryl Davies, my counselor Randa Issa and the USC Pre-Pharmacy Society, I have gained an immense amount of knowledge and insight about this field, and I could not be any more thankful. This is as much their accomplishment as mine, since I would not be here without their guidance.
Could you distill years of complicated research into an easily understandable explanation lasting just three minutes? Thirteen USC School of Pharmacy PhD students and postdoctoral researchers faced that challenge in the school’s second Three-Minute Thesis (3MT) competition.

Topics included new cancer treatment methods, how natural products can be mined to fight superbugs, and the effects of toxic chemicals on male fertility. Competitors were scored on overall organization, presentation quality, potential benefit of the research, market opportunity and credibility.

“This competition is important in helping students work on their communication skills and understand what their research is really about,” says Liz Aguiniga, the school’s associate director of graduate affairs, who organized the event.

“Communicating our research to the public is part of our responsibility as scientists,” agrees third-year PhD candidate Xiaojing Shi, whose talk on how to make cancer treatments safer earned first place. “It will help the public understand how science has made their lives better and appreciate the importance of scientific research.”

Second-year PhD candidate Jeff Dai came in second, and postdoctoral researcher Lisa Walter finished third. The top three presenters received up to $300 in awards. But the real prize is honing the ability to communicate clearly and precisely—a valuable skill in any profession and one becoming increasingly essential for scientists.

“I learned the importance of telling a story rather than hiding behind the data,” Shi says.

The 3MT competition began in 2008 at the University of Queensland, Australia, and is now held at more than 600 universities and institutions worldwide.
Bijan Motamedi, PharmD Class of 2020, won first place in the Student Poster Session at the Drug Information Association 2018 Global Annual Meeting in Boston in June for his presentation on disparities between the U.S. Food and Drug Administration and European Medicines Agency regulatory review processes. He worked with Eunjoo Pacifici, director of the USC International Center for Regulatory Science, and Nancy Smerkanich, a faculty member in the program, on the research project.

**FUTURE PHARMACY LEADERS**

Students from across California gathered at USC for the “Pharmacy Leadership Seminar: Transforming the Profession.” The daylong event fostered networking and community building for student leaders who will one day helm pharmacy research, scholarship and practice.

PharmD Class of 2019 students Jonathan Hwang and Sandy On generated the idea for this first-of-its kind event at the school. The seminar was made possible by the Margaret and John Biles Leadership Center, where Hwang and On serve as student ambassadors. Attendees came from Chapman University, Keck Graduate Institute, Marshall B. Ketchum University, UC San Diego, UC San Francisco, University of the Pacific, West Coast University and Western University.

Student groups competed with presentations of such initiatives as a student diversity committee and a medication intervention protocol used within an AIDS healthcare foundation. USC students won first place with their novel naloxone distribution program.

“Our goal was to highlight innovative projects that different schools are working on,” Hwang says. “I want the students to be able to say, ‘That’s a great idea, I want to bring that to my school as well.’”

The event featured a keynote address by Rita Shane, PharmD ’78, director of pharmacy services at Cedars-Sinai. In another speech, Steven Chen, PharmD ’89 — associate dean for clinical affairs at the USC School of Pharmacy and the William A. and Josephine A. Heeres Chair in Community Pharmacy — focused on disruptive innovation. Other disciplines came into play as well, including a talk by Laurel Felt, a lecturer at the USC Annenberg School for Communication and Journalism, that emphasized the importance of public speaking and gave students tips on how best to reach their audiences.

**A Trojan Family Affair**

Taking their first steps in becoming Doctors of Pharmacy, the 198 members of the Class of 2022 were welcomed to the Trojan Family by Dean Vassilios Papadopoulos at the annual White Coat Ceremony on August 16.

He challenged students to always be guided by their social and ethical responsibility, and to find ways to lead in their field of choice. “You are entering pharmacy at a time when the need for healthcare in our country is high, and the expertise that you will gain here at USC will prepare you to meet that need,” Papadopoulos said.

This year, eight students were coated by a special USC School of Pharmacy alumnus in their lives. Christopher and Catherine Salvatori, both PharmD ’93, jointly coated their son, Andrew Salvatori. “The phrase Trojan Family means so much more to me because I actually grew up with a family of Trojans,” the younger Salvatori said. “My grandpa went to pharmacy school here, too.”
I have always known I wanted to be a pharmacist, but in my general biology and chemistry classes, I found it difficult to see the big picture or how what I was being taught would apply to the real world. In summer 2017, I worked at the USC International Center for Regulatory Science as an undergraduate research associate, where I was introduced to the field of regulatory science. I decided to declare the new major to learn more about the different paths I can pursue as a PharmD. The major is not exclusive to pre-pharmacy students; I think that all future clinicians (doctors, nurses, dentists and pharmacists) could benefit from the classes offered in this major.”

**Annie Xie**

I originally planned on finishing a biochemistry major with the pharmacy minor. But when the new Pharmacology and Drug Development major came out, I was ecstatic! This major gives me the confidence to know that pharmacy is something I want to do. In addition, being taught by the USC School of Pharmacy professors gives me an opportunity to get to know them and the standards they expect for excellence. I am more knowledgeable and equipped to do well in pharmacy school because of this new major. The Medical Products: From Idea to Market class had a lot of engineers as well as pre-pharmacy students, so it gave me an opportunity to collaborate with students in a different field — just like how it would be in real life.”

**Nahae Kim**

I transferred to USC my sophomore year from a small, liberal arts college in my hometown of Memphis because I wanted to go to a school that had a strong science program and would give me more opportunities as a pre-pharmacy student. I was a biochemistry major before I switched to the Pharmacology and Drug Development major. I feel more prepared for pharmacy school by being in this major, and I’m able to relate what I learn in class to my everyday life.”

**Jessica Doan**

The new Bachelor of Science in Pharmacology and Drug Development already is attracting undergraduate students who want to make their mark in improving human health. USC is one of only a few universities offering a bachelor’s degree that focuses on translating scientific discoveries into clinical advances for patients. Meet some of the students enrolled in this pioneering program.

To learn more about the undergraduate program, visit https://pharmacy.school.usc.edu/programs/pre
MOVING TARGETS

Targeting Pain Management

The 17th annual Moving Targets symposium on August 17 focused on current breakthroughs in the field of pain medicine, with an emphasis on combating the opioid crisis. The USC student chapter of the American Association of Pharmaceutical Scientists (AAPS) presents this daylong research symposium each year, giving students a platform to engage with leading scientific experts. More than 200 graduate and undergraduate students, faculty members, healthcare professionals and policymakers attended the 2018 event.

Keynote speaker Rosalie Pacula, director of RAND Corporation’s Bing Center for Health Economics, discussed the need for a comprehensive solution to the opioid epidemic. Other presentations focused on pharmacogenetics in pain management, the role of the pharmacist in reducing the risk of opioids and a personal story about experiencing narcotic withdrawal symptoms.

The AAPS-USC student organizing committee was led by Chair Christian Rabot with Vice Chair Alicia Warnecke, Secretary Kabir Ahluwalia, Treasurer Lucas Gutierrez, Social Chair Eva Severado, and Communications Co-chairs Jiawen (Lyn) Yang and Xin (Fish) Yu. Assistant Professor Houda Alachkar served as faculty advisor.

Finding Solutions to a National Epidemic

This year’s theme of pain management was a timely topic, as the devastating consequences of the opioid epidemic frequently make national headlines. “Pain currently affects more people in the U.S. than diabetes, heart disease and cancer combined,” said Rabot, a second-year PhD student in the pharmacology and pharmaceutical sciences program. “The development of medications with reduced addictive potential and an improved understanding of opioid prescription and policy trends is a pressing issue in today’s society.”

Dean Vassilios Papadopoulos echoed this sentiment, adding that pain management affects all layers of society. “There is much to be done — reducing the burden of suffering from pain, while containing the rising toll of harms related to opioid use,” he said. “Research should focus not just on discovery, but on impact.”

In addition to networking opportunities, student attendees also took their research out of the lab, presenting their projects in a poster competition for cash prizes.

For more information, visit www.movingtargets.la.
Can you identify any of the students in this October 1995 visit to Eli Lilly and Company in Indianapolis? Send your comments to kellermi@usc.edu.
Creating a new home for the Margaret and John Biles Leadership Center in Seaver Hall will give students a renovated and inviting space to study, collaborate and bond with one another while networking with industry leaders.

See page 20 for more information about the new Biles Center.

My dad raised money for the school because he felt a personal responsibility to do whatever he could to help students thrive. Supporting this center both honors and extends his legacy.”

Paula Murphy
Daughter of former Dean John Biles

Support USC School of Pharmacy students and invest in their future. Give now online at pharmacyschool.usc.edu/giving
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