A Giant Leap Toward Combating Cancer

Pharmacy schools conducting cutting-edge research can offer significant contributions to the National Cancer Moonshot. 10

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Founded in 1900, the American Association of Colleges of Pharmacy is the national organization representing the interests of pharmacy education. AACP comprises all accredited colleges and schools of pharmacy, including more than 6,600 faculty, approximately 63,800 students enrolled in professional programs and 4,800 individuals pursuing graduate study.

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Note from the Editor:
The article “Setting the Stage,” which appeared in the February issue of Academic Pharmacy Now, failed to identify the playwright, Syl Jones, of “Go Ask Alice” performed at Coffman Memorial Union at the University of Minnesota.

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AACP Annual Meeting
Gaylord Opryland Resort & Convention Center
Nashville, Tennessee — July 15-19, 2017
Dear Colleagues:

While its origin is uncertain, the phrase “May you live in interesting times” seems appropriate for the first months of 2017. A shift in the political balance of power in Washington, and unrest around the world, against the backdrop of record-breaking stock markets and a slow but steady economic recovery (in some contexts) seem to be keeping many on the edge.

President Trump’s “skinny budget” and executive orders have real implications for higher education and healthcare. Despite the unusual display of bipartisan support for the historic 21st Century Cures legislation signed by President Obama in December, we brace ourselves for hard-fought battles to ensure that federal funding for research across the continuum of our members’ areas of inquiry is not gutted. The very future of the Agency for Healthcare Research and Quality is again in peril at a time when we need answers to what does and doesn’t create value in health services delivery, wellness and prevention.

The second calendar quarter of each year is wrap-up time for AACP as it is in large measure for our members’ academic year. The standing committees and special task forces appointed by President DiPiro will soon offer their thoughtful analyses of timely and important questions. In the case of the Argus Commission this included an examination of three federal initiatives—precision medicine, the Cancer Moonshot and the opioid misuse epidemic. It is a happy coincidence that each of these and several other important priorities are targeted for additional federal support in the Cures legislation. As the Argus Commission acknowledges, we can’t let up on our advocacy and engagement efforts in the false belief that last year’s legislation safeguards our priorities. These obviously extend far beyond these timely and important topics.

During this quarter AACP staff and the Strategic Planning Committee will be summarizing the progress made during the year on implementation of the 2016 AACP Strategic Plan. Progress has been made on all priorities and especially our enriched national recruitment efforts aimed at turning the tide on the Pharm.D. applicant pipeline. As President DiPiro has stated several times this year, this plan is different in that it is a plan that engages more members more directly than most previous plans have required. We look forward to sharing detailed information with members through Academic Pharmacy Now and other communications vehicles in the months ahead as we work together on the most important activities for academic pharmacy and other stakeholders.

Sincerely,

Lucinda L. Maine, Ph.D., R.Ph.
CEO and Publisher

Leading by Example

A University of Minnesota College of Pharmacy program enters ten years of connecting students with experienced pharmacy leaders—and the benefits go both ways.

By Maureen Thielemans

Imagine being a student pharmacist and you’re faced with a leadership challenge, inside or outside of the classroom. But rather than trying to solve it by yourself or in consultation solely with your peers, you’re able to meet with an experienced pharmacy leader to glean valuable insight. Together, you discuss the scenario, sharing knowledge and expertise, and apply leadership principles from literature, real-life experiences and more. It may sound uncommon and that’s because it is. But for students enrolled in the Leadership Networking Partners (LNP) Program, part of the Leadership Emphasis Area curriculum at the University of Minnesota College of Pharmacy, the partner-
ship means more than just networking—it’s about creating a community.

Now in its 10th year of operation, the LNP program provides bi-directional benefits to students and practitioners who’ve been paired by the college, with the goal of creating a two-way exchange of leadership wisdom. They meet several times throughout the year to discuss topics presented in the classroom, or address questions provided by faculty advisors designed to provoke thoughtful conversations. But the information exchange doesn’t end there. Twice a semester all 25 pairs in the program meet as a group to engage in roundtable-style dialogue, enhancing cross collaboration amongst all participants.

Academic Pharmacy Now spoke to Dr. Kristin Janke, professor in the Department of Pharmaceutical Care & Health Systems and co-director for the LEA, about the relationship between the students and pharmacists, and the benefits it brings to both parties.

Q: What was the motivation for creating the Leadership Networking Partners Program?
A. LEA students are hearing from instructors on a regular basis through the leadership coursework. To complement this, we felt it was vitally important that students hear from practitioners about the leadership challenges that they were experiencing on a daily basis. We needed to make a connection between the kinds of concepts we were talking about in the classroom and how those concepts played out in the real world.

Q: What makes the LNP unique and why do you think it’s successful?
A. We wanted students to learn about the vast experiences that practitioners have, but at the same time, ask the students to bring lessons from the classroom and discuss them with the practitioner. They complete readings together and assess how concepts would apply in a wide range of settings. It’s not a mentoring program, wherein the senior person provides the wisdom and the junior person soaks it all up, but instead both parties reap benefits.

Q: What’s the process for pairing students with pharmacists?
A. Students have access to descriptions of the pharmacists’ background and current responsibilities. Oftentimes students are attracted to someone in a particular setting that they themselves envision working in, whether it be a hospital, ambulatory care or managed care setting, for example. We do our best to match students with folks in roles that might be of particular interest to them.

Q: How do you cultivate discussion and engagement amongst the pairs?
A. For each one-on-one meeting between the student and pharmacist we suggest a reading and provide accompanying discussion questions. But we encourage them to go beyond those too. We also host orientations for both the pharmacists and students, and then we organize events during which they’re all together on campus.

Q: What are some of the other benefits to both the students and pharmacists?
A. The on-campus events are very powerful. Students present their leadership development work at roundtables with peers and practitioners, and receive feedback from both groups in a more intimate environment. They hear what’s going on in different settings, whether at other institutions or organizations, and the pharmacists benefit from learning about other successful practices. It’s about creating a smaller community, specifically around leadership, and how we can make an impact on others, but also within our own circles of influence.

By the Numbers

15 Percentage of students in a pharmacy class at the University of Minnesota who participate in the Leadership Emphasis Area

10 Number of years the Leadership Networking Partners Program has been operational

25 Number of student and pharmacist pairs in the program annually, though that number may start to increase

8 Minimum number of times the pairs meet throughout the academic year

Maureen Thielemans is Associate Director of Communications at AACP and editor of Academic Pharmacy Now.
Examining Early Life Environment and Later Life Dementia Risk

Research study at the University of Maryland will incorporate a broad range of geographically diverse populations.

By Malissa Carroll

Dr. Sarah Tom, assistant professor in the Department of Pharmaceutical Health Services Research at the University of Maryland School of Pharmacy, recently received a five-year, $475,000 career development award from the National Institute on Aging to examine the relationship between individuals’ early life social environment and risk for developing Alzheimer’s disease and related dementias later in life.

Incorporating data from several geographically diverse populations, the study aims to understand whether an advantaged early life social environment correlates to increased cognitive reserve and, subsequently, increased ability to buffer (protect) against symptoms associated with Alzheimer’s disease and related dementias later in life.

Cognitive reserve is the term used to describe the ability of some individuals to function at a cognitively normal level despite the physical presence of significant disease in the brain.
“When we think about how to prevent or delay the onset of dementia, evidence suggests that waiting until symptoms are evident is likely too late.”
— Dr. Sarah Tom

“As our understanding of dementia has evolved, researchers have discovered a complex relationship between the physical presence of brain disease and the onset of symptoms associated with the disease,” said Tom. “This study is unique in its aim to understand how early life experiences can influence brain health into older adulthood. We know that brain development occurs at an accelerated rate through age five, so early life could be a sensitive period for the development of cognitive reserve. In fact, individuals with an advantage by age five might enjoy a lifelong advantage in terms of their ability to buffer against or delay the onset of symptoms for Alzheimer’s disease and other dementias.”

**Do Advantages Play a Role?**

Dementia describes a decline in mental ability severe enough to interfere with an individual’s daily life. Alzheimer’s disease is the most common form of dementia. According to the Alzheimer’s Association, one in three seniors dies with Alzheimer’s disease or another dementia. Previous studies have uncovered a correlation between a disadvantaged early life social environment and individuals’ risk for developing Alzheimer’s disease and related dementias. However, it remains unclear whether an advantaged early life social environment correlates to increased cognitive reserve or lower levels of neuropathology (brain disease) altogether.

Tom and her research team will analyze four datasets from geographically diverse populations to complete the study: the Adult Changes in Thought Study, the Honolulu Asia Aging Study, the Religious Orders Study, and the Memory and Aging Project. The data include measures related to social environment that typically indicate opportunities to build cognitive reserve, including parental education, parental occupation, height, head circumference, and number of household members. “The opportunity to work with diverse populations means that we will be able to test our hypotheses across people with varying social experiences,” said Tom.

**Investing Now to Protect Later**

In addition to helping Tom and her team evaluate the effect of an individual’s early life social environment on his/her cognitive reserve, the data will provide insight into the role that the adult social environment plays in building and maintaining cognitive reserve.

Tom notes that she hopes one important finding from the study will be a better understanding of the factors that individuals can modify to help ensure optimal brain health later in life.

“We know that what happens to us as children is an important indicator for what might happen in adulthood, and perhaps investment in early childhood development programs may make sense not only for our health in childhood, but also for our health in adulthood. We hope that the results of our study will illuminate opportunities that we can implement earlier in the life course to help decrease dementia risk in older adults.”

Malissa Carroll is a Web Content Specialist in the Office of Communications and Marketing at the University of Maryland School of Pharmacy.
More than 200 million prescriptions for opioids are written annually—enough medication for nearly every American to have a 30-day supply. In fact, the United States is the world’s biggest consumer of hydrocodone and oxycodone.

With so many prescriptions for opioids comes the risk of accidental poisonings and intentional abuse among children. Hospitalizations for opioid poisonings in children increased nearly twofold from 1997 to 2012, according to a Yale University study published in October 2016. Safe and timely unwanted drug disposal may be a means to help prevent diversion.

Since flushing leftover drugs down the toilet is frowned upon by environmental agencies, there are few alternatives for safe disposal by patients other than waiting for a “drug disposal day” in their community. In the past, pharmacists have told patients to dispose of unused or expired medications by putting them in cat litter, sawdust or used coffee grounds. These materials absorb some of the medication, but much of it still remains and can still be dug out of the garbage and abused.

But now a Mercer University pharmacy researcher and Verde Technologies have developed a low-cost, easy-to-use system called the Deterra Drug Deactivation System. Dr. Ajay Banga, professor of pharmaceutical sciences, co-director of the Center for Drug Delivery Research and the T.P. Haines Endowed Chair in Transdermal Delivery Systems at Mercer University, along with William Fowler, director of research and development and a founder of the Minnesota-based Verde Technologies that develops environmentally responsible solutions to pharmaceutical disposal, were the principal scientists who developed the system. The project was funded through Verde’s Phase 2 Small Business Innovation Research contract with the National Institute on Drug Abuse.

The system was tested with a total of 20 psychoactive medications in

**Drop It In the Bag**

Mercer researcher develops an easy-to-use solution to keep pharmaceuticals out of children’s hands and the water supply.

By Kay Torrance

Dr. Ajay Banga of Mercer University worked with Verde Technologies to develop the low-cost, easy-to-use Deterra Drug Deactivation System, which uses proprietary activated carbon to deactivate prescription drugs.

**Just Add Water**

The Deterra system is powered by patented MAT12 Molecular Adsorption Technology, which deactivates prescription drugs using proprietary activated carbon. The system is a small pouch that contains the granular activated carbon packaged within a water-soluble film reservoir. The bag can render drugs inactive by adsorption with the simple addition of warm tap water.

“By providing an effective means of adsorbing the active ingredients, this system will help keep waste pharmaceuticals from appearing in the water supply,” Banga said.

The system was tested with a total of 20 psychoactive medications in
various formulations, including tablets, capsules, liquids, sublingual films and fentanyl transdermal patches. The system was highly effective adsorbing and deactivating all the drugs, with an average of 89 percent of the active pharmaceutical ingredients deactivated within the first eight hours, and more than 99 percent within 14 days. The activated carbon did not release the adsorbed drug even when exposed to large volumes of water and ethanol.

“We didn’t want to help solve the abuse and environmental challenges of unused and unwanted drugs while adding yet another plastic pouch to the landfill trash heap, so our pouch material contains an additive that makes the material bio-available in aerobic or anaerobic conditions that after time leaves close to zero environmental impact,” said Jason Sundby, president and CEO of Verde.

Another pharmaceutical company, Mallinckrodt Pharmaceuticals, has purchased and donated more than 1 million pouches to community groups in and around Missouri to help prevent abuse of prescription pain medications. Deterra also is available for purchase in numerous pharmacies around the country, including in Wal-Mart and Sam’s Club stores.

Kay Torrance is Director of Communications and Marketing for the College of Pharmacy at Mercer University.

“By providing an effective means of adsorbing the active ingredients, this system will help keep waste pharmaceuticals from appearing in the water supply.”

— Dr. Ajay Banga

Dr. Banga holds a Deterra pouch. “The system was highly effective adsorbing and deactivating all the drugs, with an average of 89 percent of the active pharmaceutical ingredients deactivated within the first eight hours.”
A Giant Leap Toward Combating Cancer
Pharmacy schools conducting cutting-edge research can offer significant contributions to the National Cancer Moonshot, which aims to meet ambitious research goals that will accelerate progress in the fight against cancer.

By Jane E. Rooney and Athena Ponushis

Last year, the National Cancer Institute estimated that 1.6 million new cases of cancer would be diagnosed in the United States. Data from 2012 indicate that close to 40 percent of men and women will be diagnosed with cancer at some point in their lifetimes. As the number of cancer survivors increases, so do costs; national expenditures for cancer care could surpass $155 billion by 2020. Although the overall cancer death rate has declined since the 1990s, it is still among the leading causes of death worldwide.
Launched in 2016 by the Obama administration, the National Cancer Moonshot aims to bring about a decade’s worth of advances in eliminating cancer in five years. Last December, Congress passed the 21st Century Cures Act authorizing $1.8 billion in funding for the Cancer Moonshot over seven years. The initiative will work to accelerate research efforts and break down barriers to progress by enhancing data access and facilitating collaborations with researchers, physicians, philanthropies, patients, patient advocates, and biotechnology and pharmaceutical companies. The goal is to make more therapies available to more patients, while also improving prevention efforts and early detection.

Former Vice President Joe Biden led the Cancer Moonshot Task Force (now folded into the Biden Foundation), which focuses on making the most of federal investments, targeted incentives, private sector efforts from industry and philanthropy, patient engagement initiatives and other mechanisms to support cancer research and enable progress in treatment and care. President Obama charged several federal agencies with serving on the task force to provide recommendations. After meeting with oncology experts across the country, Vice President Biden identified areas of focus and received commitments from private sector companies and organizations with which to partner and/or invest to meet the initiative’s goals.

A Key Player in Early Detection and Prevention
At a Cancer Moonshot Summit last June, more than 350 researchers, oncologists, data and technology experts, patients, families and patient advocates convened to discuss the challenges and opportunities for advancing the field of cancer research and treatment. Dr. Sarah Peters, immediate past president of the Hematology/Oncology Pharmacy Association (HOPA) and associate professor at the Albany College of Pharmacy and Health Sciences, attended the summit as a representative of the academic pharmacy community in her role as HOPA president.

“I was fortunate to be able to participate in roundtable discussions,” Peters said. “We were assigned to different workgroups and contributed ideas to White House staff about how we make 10 years of progress in five years.”

The two small group discussions focused on the topics of incentivizing breakthrough research discoveries in cancer care and supporting preventative health behaviors. In the first group, talks addressed the limitations of funding for academic cancer research, and the contrast between the tenure system rewarding the PI and not recognizing the inherent necessity for team-based research.

Peters’ second session addressed the need for funding for public health, and the importance of community pharmacists as part of the public health workforce in promoting smoking cessation, sunscreen use and cancer screenings, etc. Her recommendation was added to an ideas whiteboard by White House staff.
To ensure that the Cancer Moonshot’s goals and approaches are grounded in the best science, Vice President Biden’s task force consulted with external experts, including the presidentially-appointed National Cancer Advisory Board. A Blue Ribbon panel of experts was established as a working group of the NCAB to assist the board in providing this advice. The panel’s charge was to provide expert advice on the vision, proposed scientific goals and implementation of the Cancer Moonshot.

The panel’s report describes 10 transformative research recommendations for achieving the Moonshot’s ambitious goal:

- Establish a network for direct patient involvement.
- Create a translational science network devoted exclusively to immunotherapy.
- Develop ways to overcome cancer’s resistance to therapy.
- Build a national cancer data ecosystem.
- Intensify research on the major drivers of childhood cancers.
- Minimize cancer treatment’s debilitating side effects.
- Expand use of proven cancer prevention and early detection strategies.
- Mine past patient data to predict future patient outcomes.
- Develop a 3-D cancer atlas.
- Develop new cancer technologies.

Peters said that she sees two areas within the panel’s recommendations where pharmacy can have influence. “One is minimizing cancer treatment side effects,” she noted. “Side effect management applies to those pharmacists who are meeting with patients as a provider as part of the interprofessional clinical care team. The other is expanding the use of early detection strategies. Our pharmacy colleagues who work in community settings have a role in cancer prevention. They can recommend age-appropriate screenings. For example, pharmacists should talk with women who are 50 and older about potential calcium deficiencies and osteoporosis screening. Why can’t they recommend that women 50 and older have a mammogram and colonoscopy? Being an advocate for staying on top of health screenings and following up with primary care physicians is really important.”

Communication between the pharmacist and patient is critical, she added. “Having conversations with patients and including cancer screenings as part of those overall health and wellness conversations,” she said. “I believe we can make a decade’s worth of progress in five years.” Former Vice President Biden’s Moonshot initiative focuses on making the most of federal investments, targeted incentives and other mechanisms to support cancer research and enable progress in treatment and care. (Credit: Stephanie Brown)
explained, puts pharmacists in a position to help achieve the panel’s recommendations regarding prevention strategies. She added that clinical pharmacists are also part of the equation.

“If you see patients in a clinic and you are involved in the management of their care along with their other healthcare providers, you play a central role in their care...We help manage the side effects of treatment so that they can stay on treatment longer, which ultimately improves their survival.”

— Dr. Sarah Peters

As pharmacy schools continue to engage in research that can help the Moonshot initiative reach its goals, Peters thinks there will be a need to take a closer look at real-life outcomes. “Clinical trials are done in the ideal patient,” she pointed out. “I think the results we see are not what we’ll see in actual practice. We should be thinking about that from a drug therapy perspective as well as a population perspective. How well do these work in real patients who have all of these problems?”

With many cancer patients today suffering from other diseases at the same time, Peters noted that pharmacists need to think about the best drugs for these patients.

“How do we optimize options for cancer patients now that there are choices to make?” she continued. “In the past, there was a clear direction because there was only one drug therapy or regimen available; but that’s not the case anymore. There is a real opportunity for pharmacists to have a role in deciding the best cancer treatment as well as the supportive care medications.”

Peters also noted that, as more people are being diagnosed with cancer, oncology pharmacy is a growing practice area. “It’s important that the Academy recognizes that more of our graduates will be interacting with cancer patients,” she said. “We have more people surviving cancer and we will have more graduates taking positions to take care of cancer patients because the need is so great. We can’t think of oncology as a specialty that our graduates won’t engage in, because they will.”

Turning Research Into Reality

Equally important is academic pharmacy’s contribution to research, including looking at how cancers respond to various treatments and studying optimal dosage and medication combinations. “Our colleagues in pharmaceutical science departments are doing basic research and gaining an understanding of the biology of the disease and doing cancer research in the laboratory,” Peters said.

“Unless we really understand the biology, we can’t identify targets for treatment.” In practice, she hopes pharmacists are exploring how to optimize supportive care. “We have patients who suffer from all sorts of [other illnesses]. It’s an art to manage some of these. If we could identify risk factors and explore drug interactions, this would be an important area for practice faculty to engage in.”

Adherence to drug therapy also stands out to Peters as an area that deserves more attention. “So many cancer treatments are oral drugs. They are taken on varying schedules....sometimes they require breaks, or they are taken multiple times a day, or there are drug or food interactions. Identifying risk factors and evaluating outcomes of services is something faculty are already doing and we should be doing more of.”

“How do we optimize options for cancer patients now that there are choices to make?” she continued. “In the past, there was a clear direction because there was only one drug therapy or regimen available; but that’s not the case anymore. There is a real opportunity for pharmacists to have a role in deciding the best cancer treatment as well as the supportive care medications.”

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From Molecules to Medicine

Long before new medications even make it to patients, basic scientists like Dr. Kevin Dalby, Johnson & Johnson Centennial professor of chemical biology and medicinal chemistry in The University of Texas at Austin College of Pharmacy, play a critical part in discovering new molecules that may inspire the next cancer drug therapy. Dalby, co-director of the Texas Screening Alliance for Cancer Therapeutics, is helping to make some of those new therapies a reality, thanks to a grant of roughly $5 million from the Cancer Prevention and Research Institute of Texas to support his Targeted Therapeutic Drug Discovery & Development Program.

Involved in the initial stages of drug discovery, Dalby works with other cancer researchers, often physicians, who validate drug targets. He and his team develop tests to further explore the drug target his physician colleagues are interested in as a means to find small molecules that impact its function, the sign that they might be onto something. His ultimate goal is to generate more molecules to get them out into the hands of clinical researchers to pick up and advance the work. The more molecules with potential drug-like activity tested in trials, the more possibilities to cultivate new cancer drug therapies.

“It’s all about generating new ideas and new molecules to keep the pipeline going, because so many ideas don’t come to fruition when it comes to drug development,” Dalby said. That’s how he sees his role: finding a molecular needle in a haystack to help patients.

“Our goal is to help (researchers) get new molecules to test in preclinical studies. They will have a candidate molecule, and depending on how things look, we could try to make better versions so that they’re more potent, with more drug-like properties,” he said. “If something looks really good, then we could get it into a clinical trial.”

Presently, Dalby has several promising projects in the works. One involves an inhibitor of a protein kinase called maternal embryonic leucine zipper kinase. “We think that this is an important target in inflammatory breast cancer, and probably also in triple negative breast cancer. We are in the process of simultaneously developing new and more potent inhibitors of the kinase to test in preclinical studies, while also trying to understand the biology of the kinase in the cancer,” he said.

Other projects target metastasis in lung cancer and metabolism in pancreatic cancer. He also spoke about a project that looks to develop inhibitors against an important pathway in melanoma, for which there are clinical drugs but there’s also resistance.

“There’s a lot going on,” Dr. Dalby said.

To the Moon and Back—To Basics

There’s no doubt that Moonshot aspirations have energized the scientific and medical community. Aiming to do what could be done in 10 years and do it in five, and to combine resources and create a data ecosystem available for all that would accelerate understanding, prevention, treatment and a possible cure, is an impressive goal but Dalby cautions that the end game should not eclipse the crucial step of basic research.

“The thing that we should be constantly thinking about drug discovery is that we need to be funding the basic research where investigators are trying to understand biology behind the disease,” he said. “Only then will you develop the perspective of what might be a good pathway to direct a drug discovery program towards.”

“We must ask ourselves, ‘Are we doing the best we can to get young people interested in doing the basic, mechanistic research?’ Because if we create an environment that doesn’t look like a good place in which to work, we’re going to lose a lot of talent.”

— Dr. Kevin Dalby
The Blue Ribbon Panel recommendations could focus more on the genesis of discovery as well as on the goal, Dalby admits. “I’m always a little worried when I see these large, government directives such as this because they sometimes forget the basic work that is the foundation. It’s harder to sell that to politicians, but you can’t do it without understanding what’s going on.”

To make initiatives like the Moonshot successful, there is an important role for AACP and other like-minded organizations in supporting basic, mechanistic investigations, Dalby said. Without that groundwork, “We can’t do anything translational, and while the translational work gets the immediate accolades when it works, it’s built on the backs of many, many researchers over a long period of time. We must never forget that.”

He likens basic research to a roadmap, and says that trying to do translational work without it would be like trying to go from Austin to Dallas 100 years ago without a map. Someone may make it, but a map sure would be nice. “You cannot do translational work without knowing where you’re going,” he said. “Basic, mechanistic work is like creating a roadmap to actually get to your destination.”

The Next Mission
As a scientist in a position of responsibility, Dalby said he wanted to do something that would benefit the public. That’s when he started dedicating some of his time to thinking about the processes that go on in cancer, applying his expertise in chemistry and biochemistry.

“We must ask ourselves, ‘Are we doing the best we can to get young people interested in doing the basic, mechanistic research?’” he asked. “Because if we create an environment that doesn’t look like a good place in which to work, we’re going to lose a lot of talent.”

The medical community and legislative bodies must nurture the scientific process and attract the brightest minds to better the chances of solving problems down the road.

“I hope to encourage future researchers to meet the challenges. Science is difficult, sometimes it’s quite lonely, but mostly it’s incredibly rewarding if you do it right,” Dalby said. “If you find your passion and you follow your passion in science, there’s nothing better.”

The mission of the Cancer Moonshot Initiative—to accomplish a decade’s worth of progress in five years—is ambitious, but achievable. Still, this mission likely won’t completely eradicate a disease that is among the leading causes of death worldwide. That’s why we need a solid workforce of both clinicians and researchers to continue aiming for the stars.

Jane E. Rooney is a freelance writer based in Oakton, Va. Athena Ponushis is a freelance writer based in Ft. Lauderdale, Fla.

Building an Arsenal to Fight Cancer

Academic pharmacy is engaged in biomedical and cancer research that will produce new tools to prevent and detect disease, better treatments and improved survival rates for cancer patients that lead to longer lifespans. Below are just some of the ways that pharmacy faculty are contributing to the fight against cancer.

Two Researchers at UB Take Aim at Cancer with New Treatments
Dr. Dhaval Shah has spent the past three years searching for the Holy Grail of medicine: a cure for cancer. Shah, an assistant professor in the University at Buffalo School of Pharmacy and Pharmaceutical Sciences, leads cutting-edge research focused on protein therapeutics and the engineering of proteins for medical use.

While he hasn’t found cancer’s cure, Shah has made progress in the way the disease is treated. His efforts have helped advance development of antibody-drug conjugates (ADC), a novel molecule that can target cancer cells directly, eliminating the toxic side effects of traditional chemotherapy.

These antibodies act as a Trojan horse, targeting receptors specific to cancer cells. When the ADCs reach the tumor, the molecules release the drugs hidden inside, which are then free
to break the DNA within the cancer cells. But the drugs are only released if the ADCs reach their target, which prevents the chemotherapy treatment from harming healthy cells.

Shah’s study of ADCs caught the attention of Boston-based cancer drug developer Oncolinx. In the early stages of the startup, its founders Sourav Sinha and Riley Ennis reached out to Shah for guidance on merging ADCs with cancer medication. A mutual interest in protein therapeutics led Shah to eventually join the company as a scientific adviser.

“When you see someone doing the same science as yourself, you want to help them out,” says Shah. “Talking to people about science is what makes you a good scientist. The more I talk to like-minded people, the better my science becomes.”

The concept of targeted cancer treatment has existed for more than a decade, but the technology to make such a drug was largely developed within the past five years, Shah says. There are now three ADCs approved for use, while another 50 are undergoing clinical trials.

Dr. Joseph Balthasar, professor and associate dean for research in the School of Pharmacy and Pharmaceutical Sciences, is also taking aim at cancer through research that will test new strategies for improving the delivery of potent toxins to cancer cells. The study “Catch and Release Immuno-toxins: CAR-Bombs for Cancer,” led by Balthasar, received a five-year $1.8 million grant from the National Cancer Institute to support research that aims to use an untested method of delivering antibodies to target colon cancer cells that, if effective, could be applied to nearly any type of cancer.

“The strategy that we are pursuing is a ‘platform approach’ that may be applied to many different types of cancer,” says Balthasar, also director of the UB Center for Protein Therapeutics. “If our work is successful, we may be able to move forward to develop a panel of treatments, providing increased safety and efficacy for many cancer patients.”

Although advances have been made in the treatment of cancer with surgery, radiation and chemotherapy, there is a critical need to develop novel approaches with promise for improved selectivity, potency and efficacy, Balthasar said.

He will test a new treatment strategy that employs “catch-and-release” antibodies that are bound to powerful toxins and cell-penetrating peptides. These molecules target and bind to cancer cells, allowing for the efficient release of toxins into the cell’s cytoplasm—the fluid that fills a cell.

Preliminary data gathered to access the binding, toxicity and pharmacokinetics—how the body affects a drug—of the antibody support the feasibility of the method as a viable form of treatment, Balthasar said.


Revolutionary Approach for Treating Glioblastoma Works with Human Cells

Researchers at the University of North Carolina at Chapel Hill have made another advance in the development of an effective treatment for glioblastoma, a common and aggressive brain cancer. The work, published in the Feb. 1 issue of Science Translational Medicine, describes how human stem cells, made from human skin cells, can hunt down and kill human brain cancer, a critical and monumental step toward clinical trials—and real treatment.

Last year, the UNC–Chapel Hill team, led by Dr. Shawn Hingtgen, an assistant professor in the Eshelman School of Pharmacy and member of the Lineberger Comprehensive Cancer Center, used the technology to convert mouse skin cells to stem cells that could hone in on and kill human brain cancer, increasing time of survival 160 to 220 percent, depending on the tumor type. Now, they not only show that the technique works with human cells but also works quickly enough to help patients, whose median survival is less than 18 months and chance of surviving beyond two years is 30 percent.

“Speed is essential,” Hingtgen said. “It used to take weeks to convert human skin cells to stem cells. But brain cancer patients don’t have weeks and months to wait for us to generate these therapies. The new process we developed to create these stem cells is fast enough and simple enough to be used to treat a patient.”

Surgery, radiation and chemotherapy are the standard of care for glioblastoma, and that hasn’t changed in three decades. In months, the tumor comes back in almost every single patient, invariably sending tiny tendrils out into the surrounding brain tissue. Drugs can’t reach them, and surgeons can’t see them, so it’s almost impossible to remove all of the cancer, explained Dr. Ryan Miller, a coauthor of the study and neuropathologist at UNC Hospitals and associate professor at the UNC School of Medicine.

Read more: http://unc.live/2jB6oAD

Dr. Dhaval Shah’s work has helped advance development of antibody-drug conjugates, a novel molecule that can target cancer cells directly, eliminating the toxic side effects of traditional chemotherapy.
**UNE Professor’s Breast Cancer Detection Marker Garners National Attention**

Dr. Srinidi Mohan, assistant professor in the University of New England College of Pharmacy, received a provisional patent for his breast cancer early detection and disease monitoring method, which uses a marker in the blood to detect the presence of highly aggressive tumors and help track cancer growth. His groundbreaking research garnered attention from national media outlets, including the Associated Press, Hearst and the Portland Press Herald.

“I was simply in the right place at the right time,” Mohan said, discussing how he stumbled upon this finding in 2014 while studying nutritional supplements. He found that the marker Nω-hydroxy-L-Arginine (NOHA) was both a sensitive and reliable indicator for estrogen receptor-negative (ER–) tumors, found in the most aggressive types of breast cancer. Mohan, who had never previously studied breast cancer, began testing the marker on cell lines of African-Americans, Caucasians, Jews, Asians and Hispanics to see if it could detect tumor presence across disparate ethnicities. In each case, he found that the results aligned with his hypothesis: low levels of NOHA in the blood are consistent with ER– tumor presence.

In this study, Memphis oncologists indicated that the transportation infrastructure and geographical access to services, in part, underscore this disparity trend because low-income minority residents face barriers to obtaining services that are primarily available in distant areas of the city. Oncologists noted that high quality breast care facilities and medical providers are not located in neighborhoods that are primarily African-American. The researchers suggest that new models for healthcare delivery may be needed in order to address this finding.

How does this relate to the College of Pharmacy? In contrast to resources that are specifically designed for screening and treatment of breast cancer, pharmacy services are widely available in many of the neighborhoods where low-income African-Americans live. Nonetheless, if there are access barriers to other types of medical care services (i.e., screening and treatment of breast cancer), then there are access barriers to pharmaceutical care. This is because access to prescription medications is highly dependent on access and use of services provided by non-pharmacists.

Read more: http://dx.doi.org/10.5430/jnep.v7n6p46

**Research Finds Access Barriers to Pharmaceutical Care for Those at Risk of Breast Cancer**

Research led by Dr. Shelley I. White-Means, professor of clinical pharmacy at the University of Tennessee College of Pharmacy, has discovered that the nation’s highest racial disparity in breast cancer mortality exists in Memphis. The work is part two of a study to gain understanding of reasons for the large breast cancer mortality disparity between African-American and White women who live in Memphis.

**Startup Advances Three-In-One Cancer Drug Rooted at UW-Madison**

Co-D Therapeutics, a University of Wisconsin–Madison spinoff, is developing a three-drug cocktail to battle a wide range of cancers. The first target for Co-D is angiosarcoma, a rare and lethal cancer that arises from blood vessels. The triple-threat product, Triolimus, was invented by two of Co-D’s co-founders, chief scientific officer Dr. Glen Kwon,
Community Impact

The Triolimus package is a double-layer structure called a micelle that is only 40 nanometers in diameter—about 1/200 the diameter of a human hair. The company's submicroscopic package contains paclitaxel, a standard cancer drug, combined with two other drugs designed to reduce the resistance that often develops against chemotherapy drugs.

Although paclitaxel and related cancer drugs derived from the Pacific yew tree are in widespread use, they usually require a toxic solvent that can cause dangerous anaphylactic shock in patients. The micelle technology eliminates the solvent and allows the simultaneous administration of other insoluble drugs.

The result is a single, apparently safe package that can carry multiple drugs and, by eliminating the toxic solvents, allows for increased dosages. The carrier technology is key to these benefits, Kwon said. “The micelle can safely deliver a really potent three-drug combination, even though all of them are insoluble in water.”

Research in an animal model of angioscarcoma showed a better outcome from the triple-drug Triolimus than for a micelle carrying paclitaxel alone. In both cases, the micelle permitted a paclitaxel dose three times above the standard dose.

OSU Guo Awarded Prestigious NIH Grant

Dr. Peixuan Guo, Sylvan G. Frank Endowed Chair in Pharmaceutics and Drug Delivery Systems at The Ohio State University College of Pharmacy, has been awarded a $2.79 million grant from the National Cancer Institute (NCI) Alliance for Nanotechnology in Cancer, part of the National Institutes of Health (NIH), to identify and optimize RNA nanoparticles for cancer targeting and treatment. Guo hopes to someday promote RNA nanoparticles as a new generation of drugs for the treatment of cancers.

RNA nanotechnology has progressed rapidly during the past several years. This nanotechnology includes the integration of multiple functional modules into one nanoparticle, of which the scaffolds, ligands, therapeutics and regulators can be composed of RNA. Dr. Guo proved the concept of RNA nanotechnology in 1998 by showing that RNA dimers, trimers and hexamers can be constructed by bottom-up assembly of modified nature RNA. He published his findings in Molecular Cell and was featured in Cell.

Guo’s lab has constructed RNA nanoparticles of diverse size, shape and stoichiometry displaying high chemical and thermodynamic stability, and has demonstrated their ability to harbor different functional groups. The lab is currently working to characterize the behavior of RNA nanoparticles in vitro and in vivo, with a goal to improve the efficiency for specific cell targeting, internalization and intracellular trafficking, favorable bio-distribution without entrapment in liver, endosome escape, and tumor regression.

Guo’s study aims to dissect the intracellular pathways taken by RNA nanoparticles and enhance their endosome escape capabilities; inspect the pharmacokinetics pharmacodynamics and bio-distribution of RNA nanoparticles; and evaluate the immune responses of RNA nanoparticles to minimize non-specific side effects. Previously, they reported that the immune response of RNA nanoparticles are size, shape and sequence dependent. They can make the RNA nanoparticles non-immunogenic, or highly immunogenic to serve as vaccine adjuvants or reagents in cancer immunotherapy.

Read more: http://bit.ly/2pffuRG

Ovarian Cancer Target Molecule May Be Key to Blocking its Spread

Blocking a protein found on the surface of ovarian cancer cells could prevent or reduce the spread of the disease to other organs, according to new research at the University of Illinois at Chicago.

“The greatest barrier to our ability to treat cancer in this stage is that we know very little about the molecules that cause the disease to spread,” said Dr. Maria Barbolina, associate professor of biopharmaceutical sciences and lead researcher of the study. “The goal of our research is to identify key molecules that govern metastasis and use them as targets for the development of new drugs.”

Barbolina and her colleagues hypothesized that biomolecules successfully targeted with drugs in other cancers might also be targets in metastatic ovarian cancer. In earlier research, Barbolina discovered that a fractalkine receptor—a protein found on the cell surface—is expressed in the majority of ovarian cancer cases. It could help the cancer spread to other organs throughout the body when stimulated by another protein that binds to it.


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Ernest Mario School of Pharmacy
A PREMIER PHARMACY SCHOOL WITHIN A POWERHOUSE ACADEMIC HEALTH CENTER
At this year’s Interim Meeting, current and future leaders in pharmacy education gathered together to learn from experts in leadership development. They shared innovative practices and strategies to help attendees navigate the changing healthcare and education landscape. Appreciative Inquiry, diversity in pharmacy programs, and generational differences in the workplace were just some of the timely and important topics addressed by INfluence 2017 speakers.

Following are some highlights of the meeting, held Feb. 25–28, as told through social media snapshots.

**David D. Allen @DavidDAllen**
Darrell Kirch - Competency based education is required for health professionals! Pharmacy is ahead in this. @AACPharmacy #Interim17

**David F. Gregory @davidfgregory**
One of my favorite slides was “Culture eats strategy for lunch every day” R Clark frm CEO Merck. Get Culture Right @AACPharmacy #INterim17

**AACP @AACPharmacy**
Research shows meditation improves: Attentional Control, Emotion Regulation, Self-Awareness. #INterim17 #HealthyStartsHere @lauriecameron

**AACP @AACPharmacy**
In Nance Lucas session on Appreciative Inquiry teams imagine Pharmacy as model for advancing innov. in edu. #INterim17 #HealthyStartsHere

**Heather Petrelli @TweetTheADean**
Call on a student; they can punt once to another student but that student must answer. Throw candy for correct answer. #captureyandz

**AACP @AACPharmacy**
Generation Y will comprise 43% of the workforce in 2020. #INterim17 @ewebbhill @XYZUniversity

**Megan Hartranft @MeganPharmD**
Discussion on #ppcp at #interim17 reminds me of @ASHPOfficial’s #PAI - both emphasize importance of #pharmacist in improving health outcomes

**AACP @AACPharmacy**
@NMCorg - Improve teaching profession through focus on hands on, tech based, work along with mentoring and coaching. #NMChz #INterim17

Left: Dr. Nance Lucas of George Mason University introduces attendees to the concept of appreciative inquiry in facilitating positive change at an institution.

Center: Dynamic discussion was key to the success of INfluence 2017. Attendees gleaned new ideas and discussed strategies being implemented by colleagues across the Academy.

Right: Self-awareness is the crux of emotional intelligence, said Dr. Ann C. Baker of George Mason University. Her session focused on developing cultures to promote construct conversations around differing perspectives and new ideas.

**Save the Date**
2018 Interim Meeting ■ February 24–27, 2018
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Industry Influencers

**Opening General Session**

*Building Bridges in a Dynamic, Ever-Changing Healthcare Environment*

Kevin E. Lofton, MBA

Kevin E. Lofton is the chief executive officer of Englewood, Colorado-based Catholic Health Initiatives. He joined CHI in 1998 and has served as CEO since 2003. Mr. Lofton is widely recognized at the national level as an experienced healthcare executive whose background includes top positions in public, university, community and faith-based hospitals, including serving as the chief executive officer of the UAB and Howard University Hospitals.

Mr. Lofton will kick-off the Annual Meeting with a dynamic discussion of his health-systems leadership experience, reflecting on the amount and direction of change as the U.S. strives to embrace value and performance as key tenets of patient-centered healthcare delivery, and the inclusion of pharmacists and pharmacy as we move from volume to value.

**Science Plenary**

*Science=Solutions: The Opioid Crisis in the USA*

Wilson M. Compton, M.D., M.P.E.

Join Dr. Wilson M. Compton, deputy director of the National Institute on Drug Abuse (NIDA) of the National Institutes of Health, as he describes how the misuse of and addiction to opioids is a serious national problem that affects public health, as well as social and economic welfare. At NIDA, Dr. Compton provides scientific leadership in the development, implementation and management of NIDA’s research portfolio and works with the director to support and conduct research to improve the prevention and treatment of drug abuse and addiction.

At the Science Plenary he’ll address the opioid crisis in the United States, the rising incidence of neonatal abstinence syndrome (due to opioid use during pregnancy), and the increased spread of infectious diseases, including HIV and hepatitis C. Primary approaches to addressing the crisis include prevention, addressing the underlying addiction issues, and treating overdoses directly by increasing access to naloxone. Longer-term research includes the development of pain medications with reduced abuse/addiction potential. In addition, the ways that pharmacists can play central roles in changing prescribing practices, increasing access to naloxone, and improving access to methadone and buprenorphine with pharmacy dispensing will be reviewed.

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Reserve your room at the Gaylord Opryland by visiting [www.aacp.org/PharmEd17](http://www.aacp.org/PharmEd17), then explore all that Music City has to offer at [http://www.visitmusiccity.com/](http://www.visitmusiccity.com/).

Registration opens later this month.
Tuesday General Session
Reconciliation
Regina Holliday

Regina Holliday is a Maryland-based patient advocate and artist known for painting a series of murals depicting the need for clarity and transparency in medical records. This advocacy mission was inspired by her husband Frederick Allen Holliday II and his struggle to receive appropriate care. Afflicted with kidney cancer, Fred suffered poor care coordination, a lack of access to data and a series of medical errors and, as a result, lost his battle. These institutional flaws spurred Holliday to try to improve care for her husband, as well as for all patients who are abused in this way. As a result, Fred’s death inspired Holliday to use painting as a catalyst for change.

With her passion for advocating for patients to receive timely access to their healthcare data, her artwork became part of the national healthcare debate. Backed by her own patient and caregiving experiences, Regina Holliday travels the globe heralding her message of patient empowerment and inclusion in healthcare decision-making, offering guidance on crowd funding in healthcare. She fearlessly stands before officials and practitioners demanding a thoughtful dialogue on the role patients play in their own healthcare.

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