BUILDING BETTER INSULIN

IU LAUNCHES A NEW BREAST CANCER RESEARCH CENTER and REMEMBERING J.O. RITCHEY
IU School of Medicine seeks curiosity and compassion in the students it admits. What’s not on the list? The ability to pay. At IU, we strive to support worthy medical students like James Knight through scholarships. And you can help. Gifts from alumni and friends make the dream of a career in medicine real. Together, we can prepare the next generation of healers.
FEATURES

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Dr. Michael Weiss developed a more stable form of insulin—and aims to transform the way diabetics around the world receive their care.

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A century ago this May, Dr. James O. Ritchey graduated from IU School of Medicine and spent six decades educating thousands of healers.
Confident about the future
Med school focuses on making Hoosiers healthier and building resiliency in future physicians

Interviewed by KAREN SPATARO

JAY L. HESS, MD, PHD, MHSA, is the 10th dean of Indiana University School of Medicine, the largest medical school in the United States.

You’re now concluding your fifth year as dean. Looking ahead, where is the school headed?

We have a great deal of important work to do to improve health in Indiana in areas like infant mortality, smoking reduction, mental health and the problem of opioid addiction. We have articulated very specific goals for health in this state. As part of our strategic plan we are developing not just the metrics, but strategies for how we are going to engage with partners in communities. It’s going to involve not just clinical work, but education and research.

In terms of our research programs, we are going to continue our focus on being national leaders in select areas where we have the expertise to improve outcomes for some of the most challenging diseases, like Alzheimer’s disease. I see us continuing to be at the forefront of neurodegenerative diseases. We will continue to grow our research in cancer and translation of discoveries in cancer, particularly in the areas of genomic medicine and immunotherapy.

In education, we have some exciting opportunities to take full advantage of our regional campus structure. One of the ideas that is emerging from our strategic plan is that each campus will identify an area of excellence and fully develop that. For example, perhaps it will be engineering on the West Lafayette campus, rural medicine in Terre Haute, and an expansion of laboratory research at the Bloomington campus.

We are increasingly looking at education and asking: How do we define student success and how do we maximize it? One example of the types of changes we’re thinking about is tailoring medical school more depending on what area a student is pursuing. We could potentially have more credentials and an honors project that would involve students deeply exploring an area, working with faculty
and learning from them in new ways.

You’ve put a lot of emphasis on student wellness. The school is dedicating significant resources to expanding wellness programs, and you have a team of people working in this area. Tell me about that.

I think we have a moral imperative to make sure that our students are learning in a nurturing environment that builds resiliency rather than tears it down. I’m concerned about anxiety and mental health. I’m concerned about burnout. These are problems across our profession, not just at IU.

We can implement initiatives like our new curriculum, simulation, research experiences and a credentialing program, but if we fundamentally don’t have students who are happy, who are able to manage stress, and who are developing skills they need to manage a challenging career for the rest of their lives, we’re not going to get to the other things.

In my travels to all nine campuses, it’s a theme that comes up a lot. Students are anxious. They are worried about debt. It’s a high-risk occupation. I think they also struggle with career choice. Even after getting into medical school, there are still many, many decisions you have to make about what type of career you want to have. What type of medicine do you want to go into? I want to make sure students are making decisions for the right reasons so they can have meaningful careers, and that they base their decisions on good information from people they know.

It’s a challenging area because it’s very broad in terms of all the different ways to approach the issue. But I would say the well-being of our students is one of the fundamental factors for success and is one of my greatest concerns.

We have more than 20,000 living alumni. How can they become more involved in the life of the school?

Of course, we greatly appreciate our volunteer clinical faculty. Their work with our students is extraordinarily important. We are also very interested in tapping our alumni to help students with career advice. If you’re an otolaryngologist, talk to students about what a career in the field is like and what lessons you learned along the way. We now have a formal way for alumni to do that through our Mentor and Advising Program.

We are also very big on the idea of building community. We host Alumni Social events throughout the state, and we hope alumni will come, mingle with our students and be a source of informal encouragement.

Down the road, we would like to have a robust mechanism for surveying alumni. It’s hard to know when you graduate, “Was I well prepared?” You have to go through residency or the next stage and then look back and say, “These were things in medical school that were very valuable and useful. Do more of that.” I wasn’t as well prepared in these areas. Here are some of the things that would have been helpful.” And then we can tune up the curriculum.

Looking back on your time as dean so far, what do you see as the school’s most significant accomplishments?

In education, I would say developing and implementing one curriculum across all the campuses and advancing a culture of us being one medical school with the state as our campus. It’s a very important way of looking at the school, and fully taking advantage of all that it can offer.

On the research front, the strategy of identifying areas of priority, recruiting the right leaders and investing in teams has been very successful. Our research funding is up 40 percent over the last four years, and our NIH ranking has improved from 41st to 33rd during that time, which is really quite remarkable.

Thanks to the generosity of our donors, we’ve also been very successful with philanthropy. That’s critical for our future. You need the right plan and you need the right people. However, you also need the fuel. So far during the Bicentennial Campaign, we have established 83 new chairs and professorships and 76 new endowed scholarships. That will make us a stronger institution that is better able to weather the challenges that lie ahead, and continue to advance our missions.

What’s your favorite part of your job?

I think I’ve always been energized by the success of other people. Whether it’s a graduate student in my lab who gets a great job or a faculty member who makes some important breakthrough, there’s a vicarious pleasure in the success of the collective.

What do you wish people knew about IU School of Medicine?

We have a tremendous amount of talent and a significant amount of resources here that many people aren’t aware of. This is a medical school that has treated over 200,000 people for HIV infection in Africa. This is the school of medicine that invented echocardiography and the electronic medical record. And cured testicular cancer. And is a pioneer in regional campuses for medical education.

This school is a remarkable place in many ways—its tremendous reach across the state, its size, the number of campuses. It touches so many lives. We should be proud of our accomplishments, and we should be confident about the future.

“I think we have a moral imperative to make sure that our students are learning in a nurturing environment that builds resiliency rather than tears it down.”
This year alone, 266,000 women will be diagnosed with breast cancer in the United States. Some 40,000 women will die from the disease.

“While we have made major strides in the treatment of breast cancer, the reality is that today’s therapies are still inadequate,” said Indiana University School of Medicine Dean Jay L. Hess, MD, PhD, MHSA, who lost his mother to breast cancer when he was in college. “Far too many women still die from this disease, and others endure long-lasting side effects from treatments. We owe it to women everywhere to do better.”

With that goal in mind, IU School of Medicine is launching a new research center focused on dramatically improving therapies for some of the most difficult-to-treat types of breast cancer.

The center will be named the Vera Bradley Foundation Center for Breast Cancer Research in recognition of two decades of philanthropic support from the Indiana-based handbag maker and its charitable foundation.

“With the establishment of this center, we are putting a big stake in the ground and redoubling our efforts to find solutions for these women,” Hess said. “No one has done more to support breast cancer research in our state than the Vera Bradley Foundation for Breast Cancer, and I cannot imagine a more fitting namesake for our center.”

FACING AGGRESSIVE CANCER

While the Vera Bradley Foundation Center will conduct research related to all facets of breast cancer, it will be highly focused on triple-negative breast cancer, said Anantha Shekhar, MD, PhD, executive associate dean for research affairs at IU School of Medicine.

IU School of Medicine oncologist Kathy Miller, MD, meets with a patient with triple negative breast cancer. The new Vera Bradley Foundation Center for Breast Cancer Research is focused on developing new treatments for women with triple negative disease.
Triple-negative breast cancer tends to be more aggressive and spreads more rapidly than other types of breast cancer, and it disproportionately affects younger women. It also has a higher recurrence rate, and once it has returned, standard therapy is often ineffective.

“Right now, there is little we can offer women with triple-negative breast cancer that is specifically designed for their cancer,” Shekhar said. “It’s a huge challenge, but that makes this research all the more important. We can’t back away because this is tough. In fact, that’s all the more reason why we should focus on this disease.”

And the time is right to make this a top priority, he said.

A wave of scientific and technological advancements is enabling researchers to read each tumor’s genetic blueprint, providing clues about the specific mechanisms it depends on to grow and survive. This genomic information is used to develop precision therapies that attack the tumor’s unique vulnerabilities.

At the same time, physicians and scientists are learning how to train the human immune system to mount its own defense against cancer cells. While still in its infancy, immunotherapy has the potential to be the most promising new therapy in cancer treatment.

Shekhar said having these new tools in the toolbox “puts us in a prime position to make substantial inroads against triple-negative disease—and to potentially cure some forms of it.”

“Cure is a bold word,” Hess added. “But we really believe this is possible. We don’t expect to eradicate all forms of triple-negative breast cancer in the immediate future, but we do think we can identify subsets that are particularly vulnerable to these new types of therapies. And what we learn will help us continue to improve treatments for other women.”

AN INNOVATIVE LEADER

As a first step, the school is undertaking a national search for the inaugural director of the Vera Bradley Foundation Center. The successful candidate will lead a team of approximately 30 highly skilled breast cancer researchers and recruit new talent to IU.

To attract an innovative leader, the Vera Bradley Foundation is committing $2.5 million to establish a new endowed fund that will fuel the director’s vision. As part of For All: The Indiana University Bicentennial Campaign, Indiana University will match the gift. In addition, Hess is committing another $2.5 million in school resources, bringing the total value of the fund to $7.5 million.

This new gift brings Vera Bradley Foundation’s total commitment to breast cancer research at IU School of Medicine to a remarkable $37.5 million.

AN ARMY OF SUPPORTERS

When Patricia R. Miller and Barbara Bradley Baekgaard lost their dear friend to breast cancer in 1993, the co-founders of Vera Bradley determined they had to prevent others from suffering a similar fate. A year later, the women—aided by a group of dedicated volunteers—hosted their first golf and tennis tournament in Fort Wayne, Indiana, to raise money for breast cancer research.

On June 4 of this year, some 1,000 guests gathered for the 25th annual Vera Bradley Foundation for Breast Cancer Classic—now the largest amateur women’s golf and tennis charity tournament in the country. It was there, under a tent decked out in Vera Bradley’s bold patterns and sprinkled with plenty of pink, that Hess announced the creation of the new research center to roaring applause.

While Miller and Baekgaard have not yet achieved their goal of ending suffering from breast cancer, the message that night was clear: IU School of Medicine researchers won’t stop until they get there.
DELEIVERING A ONE-TWO PUNCH TO CANCER

IU radiation oncologist Richard Zellars is working to give women their lives back sooner by dramatically shrinking the time it takes to treat breast cancer.

By KAREN SPATARO

Just like every other year, Sandra Chapman went in for her annual mammogram in October 2016. But this time, something was different. A few days later, she got a call. Doctors had spotted a pea-sized spot and wanted to take a closer look.

In the weeks that followed, Chapman underwent additional imaging tests and a biopsy.

“The Monday after Thanksgiving, I was informed it was cancerous,” said Chapman, a mother of three who is an investigative reporter for WTHR in Indianapolis. “That’s how it all started. It was a total surprise. I have no family history, and I get a mammogram every year. I’m very faithful about that.”

About 1 in 8 U.S. women will develop breast cancer in her lifetime. For many, the therapy needed to rid them of their disease can last as long as a year, making it hard to leave a painful chapter behind. But Chapman completed her treatment—which included a lumpectomy, chemotherapy and radiation—about five months after she was initially diagnosed, thanks to an innovative research trial being led by an Indiana University School of Medicine faculty member.

Richard C. Zellars, MD, chair of the Department of Radiation Oncology, is experimenting with the delivery of existing therapies, with the aim of dramatically shortening the course of breast cancer treatment and reducing the likelihood of recurrence.

“I’ve been treating women with breast cancer for more than 20 years, and I see every day how hard the treatment is on them and their families, both physically and emotionally,” said Zellars, a member of the Vera Bradley Foundation Center for Breast Cancer Research at IU School of Medicine. “I knew there had to be a way to do this better. We’ve done a lot to improve survival rates for women with breast cancer, but we have to do more to make the treatment itself more tolerable.”

For certain types of cancer—such as esophageal, lung, colon and rectal—patients receive chemotherapy and radiation concurrently. The benefits are clear: Chemotherapy helps sensitize the tumor cells to radiation, making the radiation more effective, and patients can complete their therapy more quickly.

But that dual approach didn’t work for breast cancer. “When people tried this in the past, putting breast radiation and chemo together, patients had horrible burns, burns that were prohibitive,” Zellars said.

It turns out, the chemo doesn’t only sensitize the tumor to radiation. It also sensitizes skin, making it more likely for patients to suffer intense burns. Because treatment involves radiating the entire breast, there’s plenty of skin to scorch.

As a result, experts all but abandoned the idea of concurrent therapy for breast cancer. That means surgery is often followed by four to six months of chemotherapy, a month off, then six weeks of radiation. “It typically takes a year,” Zellars said of standard therapy.

That elongated timeline continued to gnaw at Zellars, and he wasn’t quite ready to abandon the idea of offering chemo and radiation at the same time. He noticed that, in previous studies, burns tended to be worse when a larger area of the
Richard Zellars, MD, who leads the Department of Radiation Oncology at IU School of Medicine, felt frustrated by how long many breast cancer patients must endure grueling treatment. His clinical trial aims to help patients like Sandra Chapman, pictured (far left) with her son, Quentin.

breast was radiated. He hypothesized that radiating a smaller section of a breast might solve the problem.

A relatively new and still experimental technique called partial breast irradiation allowed him to test his theory. Partial breast irradiation involves radiating a smaller, focused area surrounding the tumor, rather than the whole breast.

While on faculty at Johns Hopkins University, Zellars launched two studies to investigate the simultaneous use of chemotherapy and partial breast irradiation. He expected to see a reduction in serious burn cases but was prepared for as many 20 percent of women to encounter the problem. What he found stunned him: Not a single burn, regardless of which type of chemotherapy drug he tried. And the combined treatment was also helping to manage even a difficult-to-treat type of breast cancer known as triple negative.

Zellars left Hopkins in 2015 to join IU School of Medicine and has continued his research in Indiana. He is now leading a multi-site randomized study to compare which works better: combining chemo and radiation, or offering them consecutively. In addition to studying any side effects, Zellars will follow the women for several years to determine if one group is more likely to suffer a recurrence.

If his original hunch holds up, Zellars may transform care for women with breast cancer—and help them get back to living their lives much more quickly. “We could take six months of chemo and radiation and shrink it down to maybe seven weeks,” he said. “That makes a huge difference.”

The trial is enrolling patients at IU Health Simon Cancer Center, all hospitals that are part of the Johns Hopkins Clinical Research Network, the University of Texas Health Science Center at San Antonio, and Reading Hospital and WellSpan York Hospital, both in Pennsylvania. The Breast Cancer Research Foundation funds the trial.

Chapman learned about the trial from her oncologist, IU School of Medicine professor Kathy Miller, MD, and decided to enroll based on promising preliminary results. She underwent her last treatment session on April 27, 2017. If she had undergone standard therapy, she would have likely remained in therapy until late August.

“I could focus on healing and getting back to myself,” she said of the expedited treatment plan. “It’s still a process. I am still getting stronger every day and getting back to where I was before all this. The sooner you can start working toward that, the more positive it is, and perhaps it helps you emotionally to know that you’re making those strides.”

Chapman—whose son Quentin Taylor is a guard on the IU basketball team—said she is grateful to have this kind of research available in the city where she lives, and she hopes her participation in the trial makes it possible for other women to have similar options.

“It’s pretty incredible,” she said of the research. “I’m so grateful that IU and the Simon Cancer Center have that to offer women. No one wants cancer, but if you are diagnosed, you want the best treatment available. I feel like I was able to experience that.”
MICHAEL WEISS has developed a more stable form of insulin—and aims to transform the way diabetics around the world receive treatment.

BY KAREN SPATARO
PHOTOGRAPHS BY LIZ KAYE
MICHAEL A. WEISS, MD, PhD, MBA, had just finished his second year of medical school at Harvard University when he accepted a prestigious fellowship that allowed him to spend a year traveling and studying abroad. His parents didn't think he should go. Finish your studies first, they urged. But Weiss didn't heed their advice. It's a good thing. His year abroad piqued his interest in insulin and spurred a research career that may ultimately change the way millions of people living with diabetes manage their disease.

“All this just really couldn't be planned,” said Weiss, who was recruited to Indiana University School of Medicine from Case Western Reserve University in December to serve as chair of the Department of Biochemistry and Molecular Biology.

While a traveling fellow, Weiss set up home base at the University of Oxford in England and worked in a laboratory in the Department of Biochemistry. It was a seminal experience. At the time, the biochemistry faculty included Dorothy Hodgkin, the late Nobel Laureate who tapped into the power of X-ray crystallography to determine the 3-D structure of insulin and other critical molecules.

But his time at Oxford was only part of what motivated Weiss to make insulin his life's calling. As part of his fellowship, he made forays into the Middle East and Africa. During one trip to Africa, he learned about some of the specific challenges faced by people with diabetes in the developing world.

Human insulin and insulin analogs must be kept cool, but in parts of the world without access to electricity, refrigeration is not an option. Instead, people would bury the life-saving medication underground in clay pots to protect against the stifling heat and harsh sun.

“We need to develop insulin that can withstand high temperatures, he thought. How hard can that be?

Extraordinarily hard, as it turns out.

More than 35 years later, Weiss and his colleagues are on the cusp of accomplishing that very feat. He has launched a company, Thermalin Inc., to commercialize his research findings and forged a partnership with the French pharmaceutical giant Sanofi, which is investing in his work.

If he is successful in bringing his ultra-stable insulin to market, Weiss will do more than achieve his original goal of helping patients in some of the world's poorest countries. His discoveries could have broad
implications on the storage and delivery of insulin during natural and human-made disasters and make possible transformative delivery technologies, such as miniature, implantable insulin pumps and even bandages that secrete insulin through the skin.

And down the road, Weiss believes he can use what he has learned to deliver the ultimate prize: a “smart” insulin analog that responds to a patient’s glucose levels to prevent life-threatening reductions in blood sugar, or hypoglycemia.

“That would be revolutionary,” said Weiss, who is also serving as leader

“My hope, against my self-interest, is that fewer and fewer people will eventually need insulin.”

Michael A. Weiss
Chair, Department of Biochemistry & Molecular Biology.
Robert A. Harris Professor of Biochemistry & Molecular Biology.

Education
MBA (2010), Case Western Reserve University;
Residency, internal medicine at Brigham and Women’s Hospital;
PhD in biophysics (1986), Harvard University; MD (1985), Harvard Medical School/MIT Program in Health Sciences and Technology; AB in physics (1978), Harvard College.

Insulin is designed to be stored at between 36 and 46 degrees Fahrenheit. When it’s above room temperature, it can form amyloid, or fibers, which disable the insulin and make it unable to control blood glucose levels. Worse yet, injecting amyloid into the body may even be harmful.

The 3-D structure of insulin has three helices, one of which is unstable, Weiss explained. He hypothesized that altering the molecule to make it more stable might allow it to withstand higher heat. Specifically, Weiss focused on building a bridge between two peptide chains.

“It’s sort of like porridge that can be too hot, too cold or just right,” Weiss said. “If you make a bridge that is too long, it can still form amyloid. If you make it too short, you can’t form amyloid, but then you have no biological activity—it’s just dead. There’s a sweet spot in the middle that is just right. That’s what we’ve been investigating.”

He seems to have found it.

In two papers published online in November 2017 in the Journal of Biotechnology.
MICHAEL A. WEISS, MD, PhD, MBA, is discovering how to re-engineer insulin to improve patients’ lives. He co-founded Thermalin Inc. to commercialize his research and bring new therapies to market. Weiss and the Thermalin team are developing six novel forms of insulin that would have far-reaching implications.

**ULTRA-RAPID**
By turning on and off faster, would allow patients to better control their disease and avoid serious side effects like hypoglycemia.

**NO REFRIGERATION**
Would be critical for patients in areas of the developing world without electricity and during disasters that disrupt the electrical grid.

**ULTRA-CONCENTRATED**
Would allow for miniaturized pumps and smaller injections for patients who require large doses.

**GLUCOSE-RESPONSIVE**
Would respond to a patient’s blood sugar levels, lowering the risk of hypoglycemia and reducing glucose spikes after snacking.

**ORAL INSULIN**
Would enable patients to avoid injections.

In 1990, Medtronic developed an insulin pump that was intended to be implanted in a patient’s abdomen and would only need to be refilled every three months. The problem, Weiss said, was that the pump would get clogged by amyloid tangles because the body’s internal body temperature is too warm. Ultimately, the product failed to win FDA approval.

Weiss’ heat-resistant insulin would solve that problem and prevent clogging, he said. What’s more, his insulin can be more heavily concentrated, allowing the reservoir—and therefore, the pump—to be significantly smaller. With today’s technologies, the pump could be connected to a computerized glucose monitor, which would analyze how much insulin the person needs and release the appropriate amount. “To have this technology, everyone would want it,” said Weiss, who holds the Robert A. Harris Chair in Biochemistry & Molecular Biology. “There would be no scarring of the skin or unsightly injection-site reactions. For adolescents, there’s no embarrassment, and it would be fantastic for athletes.”

He and his team are also continuing to perfect hyper-stable insulin, which can withstand temperatures so high that it can be boiled. That would enable its use in high-temperature polymer injection molding. The purpose? Weiss seeks to manufacture a Band-Aid-like patch that Type 2 diabetics could wear on their skin to provide a slow trickle of insulin.

For patients who require high doses. Maybe even...
insulin that can be taken orally.

“He’s a guy who spans the whole range of taking something at the most fundamental scientific level that has important medical implications and translating that into a drug,” Avruch said. “To learn how to do that, he went and took an MBA. That’s especially unusual. He’s a one-man discovery and drug company.”

**When IU** School of Medicine Dean Jay Hess, MD, PhD, MHSA, first met Weiss, he was instantly impressed. Of course, there’s his outstanding curriculum vitae, but it was more than that. “He’s a seasoned leader,” Hess said. “He has this passion and curiosity, and it’s all that collectively that I really got excited about.”

Weiss was recruited as part of the Indiana Collaborative Initiative for Talent Enrichment, or INCITE. The program, established in 2017 with a $25 million grant from Lilly Endowment Inc., is designed to attract top scientists to Indiana University School of Medicine and the state. Weiss certainly fits the bill.

In his role with the school’s Precision Health Initiative, Weiss will utilize his expertise in chemical and structural biology to help other scientists identify potential drug candidates or improve existing drugs, much as he has done with his own science. His leadership will be vital in making basic science research applicable to patients.

“Without structural biology, you will hit a bottleneck,” Hess said. “If you’re interested in drug development, there’s only so far you can get without these tools.”

For his part, Weiss said he came to IU School of Medicine because he views it as a positive and growing environment that will ensure he can continue translating his discoveries into new therapies.

Growing up in Cleveland, Weiss was an avid baseball fan and was twice a finalist to be a bat boy for the Cleveland Indians. “I still love baseball, so I look at things in baseball metaphors,” he said. “The insulin pump is like a single. The Band-Aid is like a triple. The smart insulin would be like a grand-slam home run.”

One thing’s for sure: With an All-Star like Weiss on the IU School of Medicine team, we’re sure to get a win for patients.

**MAKE A GIFT TO RESEARCH**
To support diabetes research at IU School of Medicine, contact:

**KATHRYN RED**
Indiana University School of Medicine
317-274-3685
kred@iu.edu

**EARLY DETECTION**

**Carmella Evans-Molina, MD, PhD**

In life, timing is everything. The same may be true when it comes to treating Type 1 diabetes.

Diabetes occurs when beta cells, which produce insulin, stop working correctly. We now know that beta cells become stressed or injured at least 10 years before a patient first experiences symptoms.

“By the time the patient comes to clinical recognition, 80 to 90 percent of beta cells have been destroyed,” said Carmella Evans-Molina, MD, PhD, an associate professor of medicine and leader in diabetes research at Indiana University School of Medicine. “Very little can be done at that point.”

Evans-Molina’s goal is to identify the first hint of beta cell stress or death and to begin treatment immediately. But that is easier said than done. Beta cells are buried deep inside the pancreas, making it hard to know when something is going wrong. Physicians can’t simply examine the cells with standard imaging techniques like x-rays or MRIs.

So Evans-Molina, in collaboration with Drs. Raghu Mirmira, Emily Sims, Linda DiMeglio, and Janice Blum, is on the hunt for biomarkers—or warning signs—for Type 1 diabetes. By comparing samples of blood and urine from children with diabetes to those without the disease, their team can look for important differences—like flecks of proteins or molecules floating in the blood that wouldn’t usually be there. These clues may signal beta cell dysfunction and may help detect diabetes earlier.

“Without structural biology, you will hit a bottleneck,” Hess said. “If you’re interested in drug development, there’s only so far you can get without these tools.”

To support this research, Evans-Molina is creating a bank of biological samples. Every time a child with Type 1 diabetes is admitted to Riley Hospital for Children at IU Health, the family is asked to allow researchers to collect blood and urine. These samples are then used by the IU team and researchers around the world to search for biomarkers and conduct other experiments.

“We want to know what is floating around in you when beta cells are happy versus when they are stressed,” Evans-Molina said. “Then we can start to predict who is at risk for diabetes and potentially prevent further damage.”
A CENTURY AGO, 
DR. JAMES O. RITCHEY 
GRADUATED FROM IU SCHOOL OF MEDICINE. FOR THE NEXT SIX DECADES, HE PREPARED LEGIONS OF HEALERS WHO FOLLOWED IN HIS FOOTSTEPS.

THE BLACK BAG. 

The future physicians remember the relic just as distinctly as the buttoned-up gentleman who carried it. They remember how elegant he looked—attired in a suit, starched collar and tie no matter the time, day or weather. While his peers pressed elevator buttons, he briskly climbed the stairs at Methodist Hospital. And he was no mere instructor. “He was an oracle of truth and wisdom,” one of them remembered.

To the afflicted, James O. Ritchey, MD, could be a gentle presence, one who took your hand, let a full grin cross his face, leaned in and listened. In awe, medical students watched as the healer drew out details to point the way. Listen to the patient’s story, he would instruct. Ninety-five percent of the time, you will learn their diagnosis.

For six decades, he faithfully served Indiana University School of Medicine with the same quiet grace and dedication he gave to his patients.
One hundred years ago, the young man from Carroll County graduated from IU School of Medicine, embarking on a career that saw him rise to lead its Department of Medicine, chair its admissions committee and earn honors such as the Distinguished Alumni Award.

Though much has changed at IU School of Medicine—and in the profession as a whole—Ritchey remains a legend at his alma mater, and many who trained under him or worked alongside him still consider him the embodiment of what it means to be a physician. At the centennial of his graduation, IU Medicine looks back on the life of James Oscar Ritchey and how he helped shape a then-fledgling medical school.

1891 | OWASCO, INDIANA
Rummage around Ritchey’s childhood, and you won’t unearth wealth or refinement. You might not find much at all. “I’ll bet you’ve never heard of my hometown,” Ritchey joked to an Indianapolis News columnist in 1974.

Ritchey was born on Feb. 1, 1891, in the rural burg of Owasco, Indiana, less than 20 miles from Lafayette. There, Aaron and Christina Ritchey raised their eight children on a modest patch of ground. Their relatives were sprinkled between what is today Rossville and Delphi, the final stop on the family’s three-generation sojourn from the Scottish Highlands.

Much of Ritchey’s upbringing is lost to history except for the simple tale of what drove him toward medicine. A beloved country physician served as a role model, so much so that he inspired a pact between Ritchey and a friend.

“We decided in the third grade we were going to be doctors,” Ritchey told The Indianapolis Star in May 1978. “We both made it. He became a surgeon at Muncie and graduated a year before I did.”

1916 | INDIANAPOLIS
The medical student dropped his bags on the floor of a boarding house, and then he set out to find a job. In time, Ritchey’s ascendancy would begin. That fall, though, he was just a 25 year old hustling to pay bills, waiting tables at a downtown restaurant, and riding an ambulance that carried injured workers from the New York Central Railroad to Indianapolis City Hospital.

“For that, I was paid my room and board,” he told the Star.

Three years earlier, Ritchey and other farm boys had trickled into Bloomington, then a town of 4,000, to study medicine. Like the medical school that accepted them, their credentials were modest. “Most of the students wouldn’t be accepted today,” said Walter J. Daly, MD, dean emeritus of IU School of Medicine and a member of the Class of 1955. “Their grades weren’t good enough.”

Their school was also rough around the edges, less than a decade removed from a bitter dispute with Purdue University over who would run a medical program in Indiana. Charles P. Emerson, MD, the school’s newly hired dean, barely trusted his faculty. It wasn’t until 1914, on a 19-acre parcel near the White River, that Robert W. Long Hospital opened with 106 beds. Five years later, the school opened the Medical School Building at a current cost of $4.5 million.

In Ritchey’s day, medical students began their training in Bloomington, moving north
Ritchey would hold patients’ hands and lean in to hear soft answers to his questions. “Always touch the patient when you are imparting bad news,” he preached.

for the final two years of instruction and clinical work at Indianapolis City Hospital.

For his part, Ritchey shaped his life around the rhythms of his training. He didn’t enjoy much of a social life. One semester, he loaded up on 20 hours of coursework. Ritchey thrived. By his fourth year, he handled modest teaching duties, usually instructing younger classmates how to do physical exams. Years later, stories circulated among students about Ritchey’s intellect. Like the one about how he peered down the tube of a microscope at a fibrous strand, which some thought might be an intestinal parasite.

“It’s a banana peel,” he declared.

At his graduation in 1918, the school presented Ritchey with the first-ever Marcus Ravdin Medal, awarded to the student with the highest grade-point average. A couple of months later, the newly minted physician passed his licensing exams in Indianapolis. The path his career would follow, though, had been plotted out well before.

1932 | LONG HOSPITAL

Without question, Emerson was the guiding hand in Ritchey’s career. The dean oversaw Ritchey as an intern at Long Hospital. Later, he dispatched the young physician on a tour of Eastern medical schools to glean insights on clinical teaching. Finally, Emerson invited the young Ritchey to practice with him.

By 1928, Ritchey was an assistant professor, teaching five days a week, holding a clinical discussion on Saturdays, and operating his practice. Three years later, he was promoted to full professor. “Ritchey was inspired by Emerson,” Daly said, “and Emerson was inspired by (William) Osler.”

By the 1940s, Ritchey’s once a week teaching session was a staple—a public ritual at which a fourth-year student would briskly give a patient history and share findings from a physical exam. Ritchey’s critiques could be succinct, withering and incisive all at once. “I felt terribly respectful,” Daly said. “He was someone I would like to be like.”

There was the time Louis Sandock, a 1941 graduate, ticked off a patient’s medical history. He confidently told all assembled—residents, interns, nurses, and dietitians—his exam revealed an enlarged spleen. After quietly digesting the student’s report, Ritchey struck.

What if it were a mass elsewhere in the abdomen? Or an aberrant lobe of the liver? Or a tumor? “How do you know?” Ritchey asked.

Flustered, the young student stammered as he searched his mind and the room for help that wasn’t coming, Sandock wrote in a 2002 remembrance of Ritchey’s life. Suddenly, the patient popped upright and clasped his hand. “You leave him alone,” she scolded. “If he says it’s my spleen, it’s my spleen.” Silence settled over the group. Until Ritchey laughed. “He’s right ma’am,” Ritchey said.

Ritchey saved his reserves of tenderness for patients. He would hold their hands, lean in to hear soft answers to his questions, and never be abrupt. “Always touch the patient when you are imparting bad news,” he preached.

The ward was Ritchey’s habitat, and staying late was his habit. During World War II, when large numbers of faculty were shipped overseas to aid in the war effort, it
THE J.O. RITCHEY SOCIETY

The society recognizes individuals who have made planned giving commitments to Indiana University School of Medicine.

Participants in the J.O. Ritchey Society ensure the school has ample resources to continue its tradition of groundbreaking research and top-flight medical education.

For more information, contact: Tim Ueber
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Ritchey, pictured above in the 1970s, continued seeing a handful of patients until 1977 at an age when most of his colleagues had long since retired.

fell to men like Ritchey to teach two classes worth of students as IU went to trimesters. Over those four years, he might be at work as late as 11 o’clock. Even then, he would retire to the residents’ lounge to pick his colleagues’ brains.

“Although he would appear very tired at the beginning of those late evenings, he seemed rested and relaxed when they ended,” the late Glenn W. Irwin Jr., MD, wrote in a book of remembrances published about Ritchey in 2002. A 1944 alumnus of IU School of Medicine, Irwin went on to serve as dean.

And as unruffled as Ritchey could be, little incongruities popped up. On Fridays, he’d take a seat in the third row of the auditorium of Long Hospital and wait for clinical discussions to begin. An unlit cigar would dangle between two fingers. On his head, a cowlick stood at attention.

“It became common for a student to say when his hair was awry that he had a Ritchey,” Edith B. Schuman, MD ’33, who passed in 2007, recalled in her remembrance.

MAY 1978 | UNIVERSITY HOSPITAL
IU never paid Ritchey a cent.
“I checked with officials down in Bloomington,” Daly said. “And they confirmed it.”

Overseeing the Department of Medicine, which Ritchey did until 1956, was an unpaid position. Ritchey’s peers were like him: working physicians and scientists reliant on their practice or outside jobs. And even when Ritchey formally retired from the faculty in 1961, he remained in a position of prominence overseeing admissions.

In many ways, medicine was a refuge. In 1957, Ritchey’s first wife, Helen, passed away unexpectedly, leaving J.O. a widower for eleven years, until he married his second wife, Lydia. His practice, overseeing the admission’s committee, and philanthropic roles such as running the School of Medicine’s annual fund occupied his time.

On the eve of the School of Medicine’s 75th anniversary, and three years before his passing, Ritchey said he could sense the pace quickening—a tide he ably tried to swim along with. On vacations, a stack of medical journals sat within reach. If you scanned the back of a room at the annual gathering of the American College of Physicians, you might spot an 88-year-old Ritchey taking in a session on immunology.

As always, he was ever the student. “Things are happening now and will happen in the future,” he said in 1978, “that no one could have dreamt of in my day.”
Indiana University School of Medicine has a strong record of matching students to their top choice for residency programs both in Indiana and around the country. In 2018, approximately 30 percent of IU School of Medicine graduates chose to remain in Indiana for their residency training, demonstrating that we are fulfilling our commitment to prepare the next generation of physicians who will care for Hoosiers. At the same time, IU is sending students to some of the most competitive residency programs throughout the country—proof that IU medical students receive an education that empowers them to be successful in any discipline and at any location.
Jeffrey Kline, MD, left, and Nathan Alves, PhD, right, are developing a new treatment for blood clots that uses nanoparticles to deliver a clot-chewing enzyme without causing collateral damage elsewhere in the body.

‘A DEATH STAR FOR BLOOD CLOTS’

Researchers in emergency medicine are using nanoparticle technology to break up dangerous blood clots.

By KAREN SPATARO

Two Indiana University School of Medicine faculty members are using nanoparticle technology to develop a therapy to dissolve life-threatening blood clots while eliminating the risks associated with current treatments.

Roughly 900,000 Americans develop blood clots each year, and as many as 100,000 people die from them, according to the Centers for Disease Control. Clots are especially dangerous when they travel to the lungs, a condition known as a pulmonary embolism.

“A pulmonary embolism can cause the right side of the heart to get swollen and injured, and that can lead to problems such as shortness of breath and an inability to do a person’s job,” said Jeffrey Kline, MD, a professor of emergency medicine at Indiana University School of Medicine.

“In the worst case, it can cut off the blood flow so badly that it kills suddenly, and it can be a tragic end.”

After years of working in the emergency room, Kline has seen up close the toll blood clots take on patients, and he is partnering with Nathan Alves, PhD, a chemical and biomolecular engineer and assistant professor of emergency medicine, to find a solution.

Typically, a naturally occurring
enzyme called plasmin chews up blood clots. But when a clot is too big, the body can’t produce plasmin quickly enough.

A drug is currently available that activates plasmin, but its effects are systemic, kicking clot-dissolving activity into gear even where it isn’t needed. That causes a new set of problems. About 7 percent of people who receive the drug suffer a life-threatening hemorrhage, and approximately 2 percent have bleeding in the brain.

“Imagine your house has a trash can on fire,” Kline said. “The way we put the fire out now is we put on all the sprinklers in the entire house. It puts the fire out, but it also floods the house.” Kline and Alves hope their treatment works more like a fire extinguisher, hitting its target without causing collateral damage.

Their approach involves the use of a nanoparticle to deliver plasmin directly to the clot.

Here’s how: The team produces modified plasmin in the lab using recombinant engineering. Next, thousands of the plasmin enzymes are stuck to a nanoparticle designed and fabricated by Alves. (Kline describes it as a “fuzzy ball of Velcro.”) The enzymes’ clot-digesting “mouths” are held close against the particle, preventing them from chewing and doing damage as the cluster makes its way through the body.

Each of the plasmin enzymes has a u-shaped tail. It is covered with amino acids that like to bind to blood clots. When the nanoparticle bumps up against a clot, the tails stick to it and pull the enzymes loose from the nanoparticle. The enzymes’ mouths are now free to start chomping away.

As a fail-safe measure, the nanoparticles are programmed to destabilize and self-destruct if they don’t find a blood clot about 10 seconds after entering the bloodstream. That prevents plasmin from spreading elsewhere in the body or making its way to the brain, where it could cause serious bleeding.

“This thing is like a Death Star for clots,” said Kline, who was recruited to IU in 2012 from the University of North Carolina School of Medicine with funding from the Lilly Endowment Physician Scientist Initiative. “Once it sticks, it’s going to unload a lot of its cargo all at once. Then it rolls away and blows apart.”

Nanoparticle technology is still highly experimental in healthcare, and there are very few FDA-approved uses in patients. Alves said one problem is that most researchers try to package a drug inside the nanoparticle. That requires finding a way to open the nanoparticle when it hits its target. By contrast, their nanoparticle has the plasmin hanging on the outside, simplifying the process.

“It’s like bringing a peanut butter and jelly sandwich to work in a plastic bag,” said Alves, the first tenure-track PhD faculty member in the Department of Emergency Medicine. “You can’t eat the sandwich through the plastic. You have to open it. We don’t have to do that.”

“This is a really elegant solution to a complicated problem,” he added.

While the research is still in the very early stages, Kline and Alves are optimistic. They have worked with the Indiana University Innovation and Commercialization Office to file a patent for their clot-destroying plasmin.

### ABOUT BLOOD CLOTS

Blood clots can happen to people at any age, though risk increases with age. They can cause serious complications, disability and even death.

**DEEP VEIN THROMBOSIS**

A blood clot that forms deep in a vein, such as in a leg or arm, is called deep vein thrombosis (DVT).

**SYMPTOMS** | Swelling, pain, tenderness, and redness of the skin in the affected area of the body

**PULMONARY EMBOLISM**

Sometimes part of a blood clot breaks off and travels through the blood to the lungs, causing a blockage there. This is called a pulmonary embolism, or PE. Pulmonary embolisms can be fatal if untreated.

**SYMPTOMS** | Difficulty breathing, chest pain, irregular heartbeat, and coughing up blood.

### RISK FACTORS

- Hospitalization and surgery
- Trauma such as car accident or broken bone
- Cancer and cancer treatments
- Birth control methods that contain estrogen
- Pregnancy
- Hormone therapy that includes estrogen
- Family history of blood clots
- Obesity
- Immobility or sitting too long

Source: CDC and stoptheclot.org
and Commercialization Office to file a patent and launch a company, Indiana Lysis Technologies LLC, which was recently named best biotech invention at the 2018 McCloskey New Venture Competition.

While the road ahead is long, Kline and Alves plan to continue plowing forward until the treatment is ready for patients. They are continuing proof-of-concept testing with ex vivo models, including in a 3D-printed lung, and are applying for additional funding.

For Alves, who once worked in the Naval Research Laboratory, the work has become especially urgent. He has experienced a number of deaths in his family due to pulmonary embolisms, and his father was recently diagnosed with a chronic thromboembolic disorder, which leaves him with blood clots in his lungs. “It’s become very personal,” he said.

“This has humongous implications,” Kline added. “Clots kill more humans than any pathogenic cause. What’s the No. 1 killer in the United States? Heart disease. Almost all of that is a clot in a coronary artery that blocks blood flow. This could allow for rapid removal of blood clots with minimal bleeding risks.”

“Clots kill more humans than any pathogenic cause,” Jeffrey Kline said. “What’s the No. 1 killer in the United States? Heart disease. Almost all of that is a clot in the coronary artery that blocks blood flow.”
Research indicates that exercise can reduce the risk of Alzheimer’s disease. The problem, however, is that we don’t know why.

Bruce T. Lamb, PhD, executive director of the Stark Neurosciences Research Institute at Indiana University School of Medicine, has been selected by the National Institute of Aging to co-lead a study that seeks to uncover how physical activity can stave off cognitive decline in those at risk for Alzheimer’s disease.

Specifically, Lamb will study what role exercise may play in reducing inflammation and how this is linked to Alzheimer’s disease. By understanding the precise processes happening in the body when we exercise, researchers could then seek to replicate the mechanisms with new drugs or therapies.

In other words, scientists could develop medications that produce the same benefit as taking a run on the treadmill or hitting the elliptical machine. (Lamb is quick to point out that even if we reach that milestone, he sees any such therapy as a supplement—not a replacement—for actual exercise.)

“Understanding the potential benefits of lifestyle interventions such as exercise and diet is critically important, but that alone is not enough,” said Lamb, who holds the Roberts Family Chair in Alzheimer’s Disease Research. “We also must understand exactly how these interventions help protect us from Alzheimer’s disease. Only then can we exploit our body’s natural defense mechanisms to develop therapeutics that will help everyone, regardless of physical limitations or age.

Lamb’s pre-clinical research will engage a unique type of athlete: transgenic mice that have been altered to have a predisposition for Alzheimer’s disease. The mice will run on a wheel in the laboratory, allowing Lamb’s team to monitor and study changes happening at a cellular level.

He will partner with a former colleague at Cleveland Clinic who is conducting a complementary clinical trial in patients. IU School of Medicine and Cleveland Clinic are jointly receiving $8.75 million to conduct the clinical and laboratory studies.

The work dovetails with Lamb’s other major new initiative: developing mouse models for Alzheimer’s disease that more closely mimic the condition in humans. Too often, drugs that appeared promising in laboratory studies fail when they reach clinical trials in people. One theory is that the mice used in the studies don’t reflect what the disease truly looks like in people. The National Institute of Aging has awarded Lamb a $25 million grant to develop models that are more accurate, thereby accelerating the pace of drug development.

“I am excited to be working on this research and excited about the potential it holds for patients,” Lamb said.
Colton Moore was just 16 months old when he was diagnosed with X-linked hypophosphatemia, or XLH, an uncommon, painful and deforming bone disease. His mother was devastated.

She had good reason to be. Debbie Moore was also diagnosed with XLH as a toddler. She spent much of her childhood wearing leg braces and underwent several surgeries in an effort to straighten her legs. By the time she graduated from high school, she needed a walker. Today, she relies on a wheelchair to get around.

But Colton, now 12, is destined for a much different future thanks to research led by IU School of Medicine faculty members.

In April, the U.S. Food and Drug Administration approved a new drug to treat XLH that is based on patented discoveries made by Michael Econs, MD, chief of the Division of Endocrinology and Metabolism at IU School of Medicine, and Kenneth E. White, PhD, the school’s David D. Weaver Professor of Genetics.

“I have been caring for individuals with XLH for my entire career, and I have seen how painful and debilitating it can be,” said Econs, the Glenn W. Irwin, Jr. Professor of Endocrinology and Metabolism. “To see our research lead to a new drug for XLH is a dream come true. This therapy will help alleviate suffering and enable patients to live fuller, more active lives.”

XLH is typically inherited and affects more than 12,000 patients in the United States and one out of every 20,000 people worldwide. Patients are usually diagnosed as children and have bowed legs, short stature, and experience bone pain and dental abscesses.

Econs began treating patients with XLH in 1986 as a fellow at Duke University and soon launched a 30-year quest to develop new therapies for patients. In 1995, he was part of a team that discovered that a mutation in the PHEX gene causes XLH. Econs and White later played a role in determining that the “genetic typos” in PHEX somehow signaled the body to make too much of the FGF23 hormone.

High levels of FGF23 cause the body to excrete excessive amounts of phosphate in the urine. Phosphate
is a mineral critical for proper bone formation in children and bone strength in adults. Without enough blood phosphate, patients develop rickets and other debilitating symptoms of XLH.

The Indiana University Innovation and Commercialization Office licensed their patents based on the discovery to Tokyo-based Kyowa Hakko Kirin. Kyowa Hakko Kirin produced the new drug, called burosumab, and subsequently entered into a collaboration and license agreement with Ultragenyx Pharmaceutical of Novato, California, to collaborate in its development and commercialization.

Clinical trials were led in part by Erik A. Imel, MD, an associate professor of medicine and pediatrics at IU School of Medicine, Munro Peacock, MD, DSC, a professor of medicine at IU, and Thomas Carpenter, MD, of the Yale School of Medicine. The studies demonstrated that burosumab normalizes blood phosphate, thereby improving rickets and lower-limb deformity of the legs in children, and bone healing, fracture resolution, and osteomalacia in adults.

The drug received approval from the European Medicines Agency in February for use in children and adolescents with XLH. The FDA approved usage on April 17. It is the first treatment that targets the underlying cause of the disease.

Colton has been on burosumab for four years as part of the clinical trials.

His mother says the improvements have been nothing short of extraordinary.

“When Colton began this trial, his toes and feet were so turned in, he would literally trip over his own toes,” she said. “Now, he loves running around outside with his friends and roller skating. He has even performed as part of the Peru Amateur Circus for a few years.”

“Just knowing that Colton and children like Colton won’t have to go through the pain, and that they can do whatever they want to do—become whatever they want to become—is just an amazing thing,” she added.

Econs and White’s research related to XLH and other related diseases has been funded by multiple grants from the National Institute of Arthritis, Musculoskeletal and Skin Diseases and the National Institute of Diabetes and Digestive and Kidney Diseases, parts of the National Institutes of Health.

Econs also received continuous philanthropic support from the Scottish Rite of Indianapolis Foundation since joining the IU School of Medicine faculty in 1997. Without that funding, the work would have stalled long ago, he said.

In addition to funders, White also credited the many patients who participated in their research.

“Through the years, we have been trusted and aided by selfless patients who shared our commitment to finding answers,” White said. “They hosted family reunions so we could collect blood samples to study and shared personal information about their health and families.

“They signed up for clinical trials with no promise that they would benefit. They are a vital part of this story. Without them, this therapy would not exist.”

“It takes time and resources to develop groundbreaking treatments. To support this research, contact:

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“To see our research lead to a new drug for XLH is a dream come true,” Dr. Michael Econs said. “This therapy will help alleviate suffering and enable patients to live fuller, more active lives.”
Molly Duman Scheel, PhD, has worked much of her career on wiping out mosquito-borne illnesses like malaria and dengue fever. Now, realizing that dream looks increasingly possible every day.

Ever since Zika climbed from South America, through the Caribbean and into Miami residential areas in summer 2016, grant-awarding agencies have wanted to fast-track getting a mosquito-control solution to populations in need. The problem became urgent: Pregnant women were giving birth to babies with microcephaly, and the disease was discovered to be sexually transmittable.

Scheel, an associate professor of medical and molecular genetics at Indiana University School of Medicine—South Bend, has become a go-to expert. For good reason.

She and her team of collaborators, including several colleagues from the University of Notre Dame, have been studying how to use genetic engineering as a tool to control *Aedes aegypti*, a type of mosquito that transmits some of the most common and dangerous pathogens of human disease. Their research is leading to the development of a novel type of environmentally safe pesticide delivered in a surprising package—baker’s yeast.

The research centers around interfering RNA, or molecules that interfere with the expression of
specific genes. Scheel’s laboratory pinpointed which genes should be targeted to kill mosquitoes, then identified the best type of interfering RNA to do the job. Importantly, the unique, custom design means it only affects genes in mosquitoes, not in humans or other species, mitigating the potential for unintended harm.

But that discovery only solved part of the problem. The next question was how to get the interfering RNA into the mosquitoes. The answer? Yeast.

Mosquitoes are naturally drawn to yeast. What’s more, yeast is relatively cheap, widely available and environmentally friendly. So Scheel and her team engineered baker’s yeast with the interfering RNA to create a new type of larvicide. They then processed the yeast into ready-to-use tablets.

“Yeasts have been cultivated worldwide for thousands of years, and this technology can be adapted to resource-limited countries with constrained infrastructures,” Scheel said. “Yeast is easily packaged and shipped, which will facilitate regional distribution.”

Scheel imagines a day in the not-too-distant future when people around the world will drop one of the yeast tablets into a container of water to attract mosquitoes. Pregnant mosquitoes will be lured in and lay their eggs there. Their larvae will consume and digest the engineered yeast, killing them before they ever have the chance to become disease-spreading adults.

The implications are enormous: Each year, mosquito-borne illnesses kill millions of people worldwide and sicken hundreds of millions of others. Not surprisingly, support for the idea has been tremendous.

The team began developing the concept with support from the Bill & Melinda Gates Foundation in Summer 2015.

Concerned that existing mosquito control methods were meeting resistance and were not environmentally safe, the Gates Foundation sought economically viable and environmentally friendly solutions that could be introduced globally.

In summer 2016, USAID awarded Scheel $876,000 to help develop the pesticide. Department of Defense grants followed in 2017, as did funds from the National Institutes of Health. Each grant allowed the project to advance a step further.

“The interest the Department of Defense has in this project acknowledges the large number of military personnel, military support personnel and military family members who are deployed to areas where mosquito-borne illnesses are prevalent,” Scheel said. “Their exposure to Zika and dengue fever is ongoing. In the case of Zika, a troop’s potential to infect a spouse or partner is another level of concern.”

The NIH grant allowed the Scheel team to develop multiple versions of the yeast larvicides, an arsenal that may be effective across varied environments and that should be deep enough to provide alternatives if mosquitoes become resistant to some versions.

In addition to the availability of funds, Scheel said the group’s research benefits from the will of some of the funding organizations to commercialize a solution quickly.

USAID and Gates, in particular, are urging rapid development. Toward that end, USAID introduced the Scheel team to the Innovative Vector Control Consortium, which is helping her meet interested biotechnical commercial partners, refine the formulation process, conduct cost analyses and navigate the Environmental Protection Agency’s procedure for gaining regulatory approval for new pesticides.

The Indiana University Innovation and Commercialization Office, similarly, is helping Scheel negotiate the challenges of intellectual property protection, licensing and marketing technologies.

January saw Scheel and her team in Trinidad, where they met with collaborators at the University of West Indies at St. Augustine and the Trinidad and Tobago Ministry of Health. In that tropical setting, where mosquito activity and subsequent diseases occur 12 months a year (unlike Indiana), they established a site for testing of the larvicides. Once they show the efficacy of the yeast larvicides under controlled conditions, full testing will ensue, likely within a year.

Although she continues to pursue other genetic strategies for reducing disease, she believes the promise of the larvicide to relieve human suffering is a solution within reach.

“It’s nice to have the potential opportunity to have this level of impact,” she said.

To support Scheel’s research related to stopping mosquito-borne illnesses, contact:

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**MAKE A GIFT TO HELP RESEARCH**

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Organs perform many functions essential to human life, but if they stop working, there aren’t many easy options to fix them. According to the latest data from the Organ Procurement and Transplantation Network, there are more than 110,000 people in the United States waiting for a life-saving organ transplant. Each day, about 20 people die because a donor isn’t available.

But instead of waiting for a limited supply of organ donations from other humans, what if we could make the organs that we needed?

Indiana University School of Medicine scientists are closer than ever before, thanks to IU’s cutting-edge 3D bioprinting technology and a new, multi-million-dollar research agreement with an innovative industry partner.

Led by Burcin Ekser, MD, PhD, assistant professor of surgery at IU School of Medicine, the team of researchers is working to print 3D tissue from genetically engineered pig cells. Then, they use this 3D-printed tissue to develop new research models for xenotransplantation, or cross-species transplantation.

The ultimate goal is to determine precisely which genetic alterations would be needed so that pig organs could safely and effectively be used in humans. And the biopharmaceutical industry is taking notice.
Ekser, who is director of the school’s xenotransplantation research lab, recently secured a four-year, $9 million sponsored research agreement from Lung Biotechnology PBC, a wholly owned subsidiary of United Therapeutics Corporation. Lung Biotechnology is a Maryland-based company focused on organ transplantation technologies, including xenotransplantation.

“This alliance with Lung Biotechnology will greatly enhance our ability to accomplish our ultimate goal of providing an unlimited supply of organs to save human lives,” Ekser said. “It’s my passion because I’m a transplant surgeon; I don’t want anyone to die while they’re waiting for a transplantable organ.”

The idea of using animal tissue for medical purposes in humans is not new. For instance, heart valve replacements are commonly made from pig or cow tissue. When it comes to transplantable organs, pigs just might make the ideal donor. For starters, their organs are the right size. They can easily be raised in sterile environments, reducing the likelihood of infection. And since we are accustomed to breeding pigs for food, breeding them to save lives doesn’t create an ethical dilemma for many people.

But there are still significant challenges that must be overcome, the most notable of which is that the human body recognizes the pig organ as foreign and rejects it. To address that problem, xenotransplantation researchers from around the globe have been working for years to create genetically modified pigs whose organs are more compatible with the human immune system.

To some extent, research has been hindered because breeding full-sized, genetically modified pigs is a long, tedious and costly process. That’s why Ekser and his colleagues came up with a novel approach that just requires a few cells.

Here’s how it works: Ekser and his collaborators print genetically modified pig cells to make a mini organ model in a laboratory. Then they perfuse the model with human blood to see how it responds. They plan to keep testing model pig organs with different genetic modifications until they identify the version that is least likely to be rejected by the human body. The approach is quicker, cheaper and more effective than growing full-sized pigs, he said.

“That’s the reason that we do 3D bioprinting in xenotransplantation research,” he said. “It saves lives, saves money, saves time, saves effort... and it still gives us the answers we want.”

To enable this work, the group is tapping into IU School of Medicine’s growing research infrastructure, including a scaffold-free 3D bioprinter and a custom 3D bioreactor. IU was one of the first academic institutions in the U.S. to get this bioprinter and is now one of only two academic sites in the country with the technology.

Anantha Shekhar, MD, PhD, IU School of Medicine’s executive associate dean for research affairs, said the collaboration with Lung Biotechnology aligns with the school’s goal to work with industry to speed the translation of scientific discoveries to patients.

“We want to make discoveries and conduct research that will help patients as quickly as possible,” Shekhar said. “One of the most effective ways to do this is to collaborate with private industry. Lung Biotechnology and its founder, Dr. Martine Rothblatt, are great collaborators for IU School of Medicine to make this happen, and Dr. Ekser is a wonderful example of how our researchers can work within the public and private sectors to be innovative and develop real solutions for patients.”

From his perspective, Ekser said IU School of Medicine provides the ideal environment to enable his research. Importantly, he was able to identify outstanding collaborators with world-class skills. Lester Smith, PhD, is the manager of the bioprinting core and assistant professor of radiology and imaging sciences at IU School of Medicine. And Ping Li, PhD, is an assistant research professor of surgery and an expert in genetic engineering.

“IU Health has one of the best clinical transplantation institutes in the nation and IU is home to some of the best transplant and immunology researchers in their fields,” Ekser said. “Together with the university’s 3D bioprinting technology, it’s a powerful combination for our xenotransplantation research lab.”

**MAKE A GIFT TO HELP RESEARCH**

To support transplant surgery research at IU School of Medicine, contact:

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Amy Krambeck, MD, is one of the world’s leading experts when it comes to the treatment of kidney stones, and she brings to her job a genuine understanding of the pain her patients are forced to endure. “I’ve had a stone during pregnancy and I’ve also had children, and I’ll tell you, the stone was way worse,” she said.

So in addition to helping patients manage kidney stone disease, Krambeck, a professor of urology at Indiana University School of Medicine, is actively researching why stones develop in the first place and how to prevent them.

It’s a timely topic. The prevalence of kidney stones is on the rise, with more than 22.1 million cases reported worldwide in 2015.

Humans have been battling kidney stones throughout history, with evidence of treatment going back to ancient Mesopotamia and stray stones turning up in the pelvises of Egyptian mummies. They are notoriously painful, with even the driest medical literature using phrases like “excruciating,” “agonizing,” and “worse than childbirth.”

Stones occur when minerals and salts from inside the kidney clump together, forming hard deposits. They have many causes, ranging from genetic disorders and obesity to dehydration and taking certain medications. Krambeck’s research specifically focuses on
the pathogenesis of stone disease. The hope is that by understanding precisely what promotes the formation of stones, researchers can then discover how to interfere with that process and disrupt it.

“Most people would never form a stone because the urine passes out of the kidney too quickly,” said Krambeck, who was recruited to Indiana University School of Medicine from Mayo Clinic in 2016. “So even though their urine is capable of forming crystals, it shouldn’t sit there long enough for those crystals to form into full stones.”

Krambeck is zeroing in on precursor lesions that develop in the kidney as a possible culprit. One theory is that these lesions provide something the minerals can cling to.

“We’ll find these microscopic, tiny stones embedded inside of the kidney in the ducts that are supposed to create urine,” she said. “So the stones, we believe, either started there, grew bigger and came out, or the crystals attached to those sites.”

Krambeck, who grew up in a tiny farming town in Missouri, first became interested in urology as a medical student at the University of Missouri. She was drawn to surgery but also wanted the opportunity to have long-term, meaningful relationships with patients. Urology seemed to strike the right balance.

“That’s why I love stones,” she said. “I’m not just surgically removing a stone. There’s a lot of primary care involved where you try to figure out exactly what’s going on and treat it.”

“I’m not just surgically removing a stone,” Dr. Amy Krambeck said. “There’s a lot of primary care involved where you try to figure out exactly what’s going on and treat it.”

She completed her residency at Mayo Clinic and an endourology fellowship at IU School of Medicine and the Methodist Institute of Kidney Stone Research before serving on the faculty of Mayo Clinic for seven years. But IU—and the opportunity to practice at IU Health—lured her back. IU Health Methodist Hospital is one of the highest-volume kidney stone centers in the United States.

“What drew me to IU really was the opportunity at this hospital,” Krambeck said. “Having done a fellowship here, I knew how innovative the operating room was, and the hospital, and the people that work here. I would be able to try new equipment, try new procedures, and really expand my research. I’m very grateful to be here in Indiana. I think it’s an amazing opportunity and I’m thankful that I could come and be a part of this program. I think there’s so much to offer here.”

When not tackling kidney stones, Krambeck also treats benign prostatic hyperplasia, also known as enlarged prostate. She is one of the few doctors in the United States who performs Holmium Laser Enucleation procedures, a minimally invasive treatment to remove obstructive prostate tissue.

Krambeck holds the Michael O. Koch Chair in Urology. Established in 2014 by Indiana businessman and IU alumnus Donald C. “Danny” Danielson, the chair is named for Michael Koch, MD, the chair of the Department of Urology who successfully treated Danielson for bladder cancer. Although Danielson has since passed on, his philanthropy has helped make Krambeck’s work at IU possible.

“Patient gratitude and philanthropy allow us to do what we do,” Krambeck said. “I have my research time because Mr. Danielson gave that money. It’s allowed me to continue research, to continue to help more people, and to advance the field.”
Helen Brown is accustomed to living in pain. Some 20 years ago, she was diagnosed with gastrointestinal carcinoid tumors, a slow-growing cancer that wreaks havoc on the digestive system. She suffers through vomiting and sometimes debilitating diarrhea, and can experience intestinal block-ups that leave her doubled over in so much agony that her blood pressure spikes. On top of all that, she has spinal stenosis.

“So it’s a combination of the two of them that really tears her up,” her husband, William, said. “It’s awful.”

Brown is among legions of cancer patients who have seen their quality of life eroded by their disease. And while research breakthroughs have helped save and extend lives, too many patients—and their families—still struggle to manage the symptoms, pain and stress that often accompany a cancer diagnosis.

A $14 million gift to Indiana University School of Medicine aims to change that.

The Walther Cancer Foundation’s $14 million gift will focus on cancer patients’ physical, mental and spiritual well-being.

By KAREN SPATARO
being. The program will be named the Walther Supportive Oncology Program in recognition of the foundation’s generosity. It is believed to be the largest gift in the country to support a program of this kind. As part of For All: The Indiana University Bicentennial Campaign, the gift will receive matching funds from Indiana University, dramatically increasing the depth and breadth of what researchers, physicians and other caregivers can accomplish.

“In the future, I hope we don’t just look at a patient and think we are treating a tumor, but rather supporting a person, so that we broaden the care we’re providing,” said Thomas W. Grein, president and chief executive officer of the Indianapolis-based Walther Cancer Foundation. “I also hope that once we have built this model, it can be replicated from institution to institution around the nation and perhaps around the globe.”

James F. Cleary, MD, an international leader in the field from the University of Wisconsin School of Medicine and Public Health, has been recruited to IU School of Medicine and will serve as the inaugural director of the program.

The program will be developed in partnership with Indiana University Health, one of the largest academic hospital systems in the United States. It is also intended to influence care for cancer patients and their families throughout Indiana and the country by providing expertise and best-practices for other health systems to model.

For the Browns, who know all too well the physical and emotional toll that cancer takes, the idea of such a program is extraordinary. “I am so grateful that somebody else cares enough about you and your pain and what you could be going through,” Helen Brown said. “To give a gift of hope is so big, and I appreciate it.”

Supportive oncology is related to palliative care, a growing discipline that provides extra layers of support for patients with serious illnesses. While many people associate palliative care with end-of-life care, it is intended to support patients during all phases of illness beginning at the point of diagnosis and in tandem with therapies designed to cure or improve symptoms, and extends into survivorship.

Examples of services and expertise that will be included in the program include:

- Pain management
- Management of symptoms such as nausea, fatigue and neuropathy
- Psychological and psychiatric services, which are critically important for cancer patients who frequently experience depression, pain and anxiety
- Spiritual care
- Assistance navigating financial concerns, transportation issues and at-home support
- Complementary services such as nutrition assistance, smoking cessation and other types of behavior modification
- Systematic communication about patients’ values and preferences

While many of these services currently exist, they are typically offered in piecemeal fashion. A comprehensive, team-based supportive oncology program aims to assess patients’ needs throughout their cancer treatment and integrate services as part of routine cancer care. Importantly, these services will be embedded in cancer clinics or closely coordinated with the oncology team, preventing patients from having to juggle multiple appointments at different times.

The Walther Supportive Oncology Program will also place a heavy emphasis on research in areas such as physician-patient communication, care coordination, symptom management and the long-term effects of cancer on survivors. The program includes laboratory research to predict which patients will suffer side effects to specific therapies and how to mediate them, and to discover treatments that are less toxic.

In addition, the program will include an educational component to train the next generation of clinical leaders in supportive oncology. “Through research and innovation, we will develop a supportive oncology program that will be a model for the nation,” said Jay L. Hess, MD, PhD, MHSA, IU’s vice president for university clinical affairs and dean of IU School of Medicine. “Just as we are continuing to advance cancer treatments by personalizing therapies, we must reimagine the way care is delivered, so we are able to tailor support services for each patient and family. We will bring to bear existing resources, recruit some of the best minds in the field, and make this vision a reality for cancer patients.”
George Sorrells, MD ’62, and his wife, Barbara, are long-time supporters of medical scholarships, driven by the belief that cost alone shouldn’t put a career as a physician beyond the reach for capable students.

PROVIDING A BOOST

When George Sorrells attended IU, part-time jobs would cover tuition and bills. Times are different today. It’s why he and his wife support scholarships.

By MATTHEW HARRIS

George Sorrells spent one summer in medical school working on an assembly line bolting bumpers onto buses to help pay for his degree. Fortunately for him, he found more than a paycheck at the job. The woman who dropped his check each week became his wife.

Soon George and Barbara Sorrells were both working to finance his medical education. During the school year, George, a member of the Indiana University School of Medicine Class of 1962, worked nights at Marion County General, now known as Eskenazi Hospital. Barbara got a job in the school’s purchasing office.

George takes pride in the fact that he graduated from medical school debt-free, but he knows today’s students often aren’t as fortunate. Tuition and fees for an in-state student now cost more than $38,000 a year—a price that is in line with other public medical schools but still out of reach for many Hoosiers. “It’s incomprehensible to us how medical students get by,” he said.

Today, George and Barbara live on a farm near Mitchell, Indiana. He has spent the last 55 years caring for children in Southern Indiana, where he is beloved by families and colleagues. It’s a fulfilling career that he wouldn’t trade for anything. And, through their generosity, George and Barbara are paving the way for others to pursue a similar path.

For more than 30 years, the Sorrells have donated to scholarship funds at IU School of Medicine, and even established the endowed George and Barbara Sorrells Family Scholarship that will support students for generations to come. The Sorrells have also made arrangements to leave a lasting legacy through a planned gift. “An education is so important,” Barbara said. “It’s just our goal to help these young men and women.”
Courtney Roberts peered out the window of Moi Teaching and Referral Hospital in Eldoret, Kenya, and she instantly recognized an alley she had never set foot in before. There were the cinderblock walls. The patch of ground was unchanged. She imagined patients lining both sides. They sat in plastic lawn chairs. IV lines dangled from their arms. Metal pans rested next to them on the ground, waiting to be snatched up if nausea became too much to bear. It was a sight Roberts knew well. Tacked up in her office at Eli Lilly and Company, where she works supporting the drug maker’s global health initiatives, is a photograph framing the same scene. Next to it hangs another snapshot: a man leans back in a recliner, hands propped behind his head, a blanket pulled up to his chin and an easy grin on his face. He looks confident. Not like a patient passing time in an infusion suite as chemotherapy drugs flow and fight stage 2 pancreatic cancer.

Roberts’ dad would often send her photos while he was receiving treatment to show her daughter that he was going to be just fine. “The photo says, ‘I’ve got this,’” said Roberts, whose father ultimately succumbed in December 2014.

In July 2016, four flights carried Roberts to Kenya, but the scene she was familiar with from the photo was gone. Instead, the Chandaria Cancer and Chronic Disease Center opened its doors. Built with significant funding from the Lilly Foundation and other generous donors, it is the first public facility in western Kenya capable of screening and treating patients with cancer.

During Roberts’ visit, as she gazed out the window into the alley, Patrick J. Loehrser Sr., MD, director of Indiana University Melvin and Bren Simon Cancer Center, asked her a question. “What do you see?” Loehrser said. “No more tents,” she replied. While Roberts had spent five years working closely with AMPATH, her visit and the sights she saw helped sway her to take the next step and personally support the consortium’s work.

“When I made the trip and was able to see with my own eyes the improvements that were being made and the lives being saved, it was no longer part of my job,” Roberts said. “It turned into something very personal.”
Strolling across the Indiana University campus, Kyle Hornsby attracted his fair share of double takes during his first year of medical school. At 6-foot-5, Hornsby was hard to miss. And at a basketball-obsessed school, the attention made sense. Three years earlier, Hornsby’s shooting stroke propelled the Hoosiers to the finals of the NCAA tournament. On a roster lacking traditional star power, Hornsby, who shot 47.3 percent from the 3-point line in March 2002, was emblematic of IU’s first Final Four team in a decade.

“Now I’m just a tall doctor” said Hornsby, a 2009 graduate of Indiana University School of Medicine who today works as a cardiologist in Bloomington.

When he first entered IU Bloomington as an undergraduate, Hornsby’s outlook on his hardwood career was realistic. He knew the chances of a professional career—even in Europe—were slim. He planned to earn his degree in kinesiology and enter a physical therapy program when his college days ended.

Instead, the guard pivoted and set his sights on medicine. A decade later, the path he chose remains surprising.

Kyle Hornsby, MD, found his niche in the electrocardiogram room at the office of John Strobel, MD, a Bloomington cardiologist. For Hornsby, assembling the puzzle pieces provided by EKG readings hooked him. (Chris Howell/Bloomington Herald-Times)
Kyle Hornsby helped lift Indiana to the 2002 NCAA Final Four, hitting 47.3 percent of his 3-point attempts for the Hoosiers. After graduating, he did two more years of coursework to lock up prerequisites to attend IU School of Medicine.

“No one in my family is a physician,” he said. “It wasn’t established in kindergarten that I was going to do this. It was just a step-wise progression. If I had said I wanted to do this as a freshman in college, I would have no clue what that meant.”

To prepare himself for medical school, Hornsby spent two years after earning his bachelor’s degree checking off prerequisites and studying for the MCAT. He was admitted to IU School of Medicine and donned his short white coat in August 2005.

The School of Medicine has nine campuses across Indiana, and Hornsby spent his first two years in a familiar place—Bloomington—before moving to Indianapolis to complete his clinical rotations.

He credits four years of college basketball with instilling in him time management skills and study habits that helped him thrive in his new role as a medical student.

As a player, Hornsby sat through film sessions, digested scouting reports, sweated through several hours of practice and traveled for games—a time crunch that often surpassed 20 hours per week.

“I was more prepared than most,” he said of medical school’s rigors. “You learn to prioritize when playing a college sport. What are the things worthy of your attention? What are the things you can do without? The profession is still busy and still tough at times, but it’s nothing I haven’t done before.”

Hornsby was drawn to cardiology while doing a required reading on the field between his first and second years. At the same time, John Strobel, MD, a Bloomington cardiologist, alumnus and volunteer faculty member for the School of Medicine, invited him into the electrocardiogram room to observe how he analyzes the electrical impulses of the heart.

To Hornsby, the EKG’s readings and data were puzzle pieces for him to assemble and interpret. Even now, he admits to losing track of time when conducting exams or studying the results.

“I was hooked,” Hornsby said. “He didn’t have to let me in the room, and I’m grateful to him for giving me those experiences when I was still a medical student trying to figure things out.”

The mentoring by faculty and physicians like Strobel not only made medical school meaningful, but it helped position Hornsby for his successful residency in internal medicine at Duke University and a fellowship in clinical cardiac electrophysiology at the University of Michigan.

Along the way, he had another mentor in Larry Rink, MD, a Bloomington cardiologist who has served as the Hoosiers’ team physician for nearly 40 years and ultimately sold Hornsby on a return to Indiana. “As soon as I started talking about doing cardiology during my first year of med school, he was already working on his recruitment to get me back here,” Hornsby said.

The pitch worked. Hornsby joined Premier Healthcare, now Indiana University Health Southern Indiana Physicians, in 2015.

When Hornsby shows up to work these days, he works alongside Strobel and Rink. Hornsby has also kept ties to the Hoosier basketball program through Rink, and he’s worked alongside his mentor doing heart evaluations at the World University Games.

“It’s a great community,” Hornsby said. “The road has always led back here.”

“HAVE A STORY? LET US KNOW.”

If you know Indiana University School of Medicine alumni making an impact, contact:

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Indiana University School of Medicine’s roots in Bloomington run deep. When the school first opened in 1903, it was located on the Bloomington campus, and despite moving its flagship campus north to Indianapolis, the medical school has always maintained a significant presence in town.

It seems fitting, then, that the Bloomington program will soon move to new facilities that reflect both its proud history and commitment to innovation.

Peter Nalin, MD, interim director for IU School of Medicine–Bloomington, said the new facilities will bolster the already strong academic program experienced by medical students in Bloomington. Being physically connected to the clinical facilities will make it easier for physicians to participate in teaching during the basic science phase of medical school. At the same time, the proximity will ensure students are familiar with the hospital and outpatient clinics from Day 1. Students will also continue to have easy access to world-class research opportunities at IU Bloomington.

“They will have all the amenities of an academic health center in a Big 10 university setting,” said Nalin, who is also an associate dean at the medical school.

### New Evansville center set to welcome students

The new home for Indiana University School of Medicine–Evansville in the city’s downtown will welcome its first students in August.

The building, recently named the Stone Family Center for Health Sciences, is a partnership between IU, the University of Evansville, and the University of Southern Indiana. Bringing health professional education programs from all three institutions together under one roof will ensure students are prepared to serve patients as part of a seamless team after graduation.

The building is named in honor of Bill and Mary Stone, Evansville natives who announced a $15 million gift to support the collaboration in May. “This is so much more than a new building,” said Steven G. Becker, MD, associate dean and director of IU School of Medicine–Evansville. “This is a commitment to the future of health care in Evansville and the region. Our expectation is that the students we educate here will come to view this community as their home and choose to remain here to practice medicine.”
HONORING EXCELLENCE

Four alumni celebrated for contributions to research, education and care.

**MYRON H. WEINBERGER, MD**
DISTINGUISHED ALUMNI AWARD

- A standard piece of advice for individuals, even those without hypertension, is to cut back on salt intake.
- The scientific basis for this is due to the pioneering work of Myron H. Weinberger, MD '63, who served on the IU School of Medicine faculty for over five decades.
- Weinberger was the first to show high doses of estrogen in birth-control pills was a cause of hypertension in women. He also published over 250 peer-reviewed scientific papers and 25 books and book chapters.

**JAMES E. LINGEMAN, MD**
GLENN W. IRWIN JR., MD DISTINGUISHED FACULTY AWARD

- James E. Lingeman, MD '74, has achieved a feat few physicians can claim: changing how medicine is practiced in their specialty.
- Lingeman, who joined the faculty in 1980, has been a longtime leader in urological surgery and stones research.
- He was the first physician in Indiana to use high-energy shock waves to break up kidney stones. Later, he was a national leader in performing and teaching keyhole surgeries, which requires only a small incision and laser fibers to break up large stones.
- Since 1988, Lingeman has overseen urology residents at Methodist Hospital. As a researcher, Lingeman has published more than 300 peer-reviewed articles and 64 book chapters.
- For nearly 30 years, his research to study stones and the effectiveness of lithotripsy has been funded by the National Institutes of Health.

**KENNETH E. BOBB, MD**
GEORGE W. SORRELLS, JR., COMMUNITY PHYSICIAN AWARD

- Kenneth E. Bobb, MD '52, has been dedicated to community health in his hometown for more than six decades.
- It began in 1955, when he returned to Seymour, Indiana, after serving in the U.S. Air Force during the Korean War. Bobb started his practice just two blocks from what is now called Schneck Medical Center and ran it until 1999—a span in which he delivered more than 2,000 babies and administered anesthesia more than 10,000 times.
- He also had an active role beyond his clinical practice in improving community health. For 43 years, he served as medical director at the Lutheran Community Home, which provides skilled nursing to seniors.
- He also helped the United Way establish a federally qualified community health clinic. After his retirement, Bobb served as public health director for Jackson County for 15 years.

**FARUK H. ÖRGE, MD**
EARLY CAREER ACHIEVEMENT AWARD

- The demand for a sliver of time from Faruk H. Örge, MD, never ends.
- He works to save the sight of children facing glaucoma. He oversees the fellowship program at Cleveland’s University Hospitals, which are linked to Case Western Reserve University. Finally, there are his ongoing research projects.
- Yet Örge, who trained at IU School of Medicine for seven years, balances it all.
- Örge, who is director of pediatric ophthalmology and adult strabismus, also serves on committees for multiple professional organizations. And he was editor in chief for the Knights Templar Eye Foundation Pediatric Ophthalmology Education Center, a comprehensive online educational resource.
- Örge is a pioneer in conducting minimally invasive surgeries involving lasers to help relieve pressure inside the eye and curb the risk of blindness.
Radically expanding our understanding of disease and devising new treatments requires not only brilliant minds but resources to empower their work.

In the 2017 federal fiscal year, Indiana University School of Medicine scientists and physicians amassed more than $135 million in funding from the National Institutes of Health—setting a school record and moving IU into the top 33 NIH-funded schools nationally.

The influx of research dollars is a 40 percent increase in NIH support over the past four years and a 13 percent increase from 2016. In total, IU garnered more than $316 million in funding from all sources during the 2017 calendar year.

“The dramatic increase we’ve seen in our NIH and other funding is a tribute to our faculty,” said Jay L. Hess, MD, PhD, MHSA, dean of IU School of Medicine and vice president for university clinical affairs at IU. “Our faculty is growing our research in areas of critical need, with the ultimate goal of making lives better for patients.”

Assembling a talented group of scientists is just one facet of earning ample support, said Anantha Shekhar, MD, PhD, executive associate dean for research affairs at IU School of Medicine and associate vice president of research for university clinical affairs at IU. The school’s also put resources in place to help worthy ideas score research dollars. For example, researchers have access to programs to help craft better proposals, faculty committees to review and give feedback on grant applications, and services such as biostatistics and 3D imaging.

The impact of research funding is also felt beyond IU.

“NIH funding has multiplier effects,” Shekhar said. “It provides direct funds to hire more people to work on different research projects, so it creates jobs. It increases discoveries and potential commercial ideas that have an impact on the local biomedical industry.”

“Increased funding also helps IU School of Medicine become a stronger environment for research, attracting more scientists to come here and develop their own labs and companies.”
NATIONAL LEADER HEADS MEDICAL EDUCATION

Paul M. Wallach, MD, a nationally recognized leader in academic medicine, joined Indiana University School of Medicine in February as executive associate dean of educational affairs and institutional improvement. In his new role, Wallach serves as chief academic officer and has responsibilities that span the continuum of medical education and academic affairs.

“IU School of Medicine is an incredible medical school,” Wallach said. “The dean, senior leadership, faculty, staff, residents and students all impressed me as leaders who deeply care about the missions of academic medicine. I chose to join the school because we share a passion for its vision and mission, and I believe I can assist IU School of Medicine in reaching its goals.”

Wallach came to IU from the Medical College of Georgia at Augusta University, where he was vice dean for academic affairs and professor of medicine. The school is Georgia’s only public medical school and consists of five campuses, preparing him well for IU School of Medicine’s nine-campus system.

Wallach graduated from Rollins College in 1980 with a bachelor’s degree in chemistry. He earned his doctor of medicine degree from the University of South Florida Morsani College of Medicine in 1984, where he also received the college’s distinguished alumnus award in 2011. Wallach completed his residency in internal medicine at the University of South Florida, where he served as the chief resident in 1987. He completed a faculty fellowship in general internal medicine at the University of North Carolina at Chapel Hill in 1992.

Wallach’s previous appointments include vice dean for medical education at New York Medical College and vice dean for educational affairs at the University of South Florida Health Morsani College of Medicine in Tampa. He has served on national boards and provided leadership related to professional licensure, accreditation, and test development and governance activities for more than 20 years, and is highly regarded for his expertise in both instructional design and evaluation.

ALUMNUS RETURNS TO LEAD OPHTHALMOLOGY

A native Hoosier and IU School of Medicine-trained physician returned to Indiana in November to serve as chair of the Department of Ophthalmology and director of the Eugene and Marilyn Glick Eye Institute. David K. Wallace, MD, MPH, most recently was a professor of ophthalmology and pediatrics, vice chair for clinical strategic planning, and director of clinical research for the Duke University Department of Ophthalmology.

Born in Indianapolis and raised in South Bend, Wallace earned his undergraduate degree from IU and is an alumnus of IU School of Medicine’s class of 1990. He completed his residency training at Baylor College of Medicine in Houston, Texas, and he was fellowship trained in pediatric ophthalmology at IU School of Medicine.

Prior to Duke, Wallace was on the faculty at the University of North Carolina, where he served as ophthalmology residency program director for six years and obtained a master’s degree in public health in epidemiology. His primary research interests are retinopathy of prematurity, amblyopia and clinical trials.

Wallace, the Marilyn K. Glick Professor of Ophthalmology, succeeded Louis Cantor, MD, who served as chair of the department since 2009.

MIRMIRA NAMED WELLS CENTER DIRECTOR

Raghu G. Mirmira, MD, PhD, was named director of the Herman B Wells Center for Pediatric Research, continuing IU School of Medicine’s commitment to scientific discovery that spurs innovative medical treatments and care for children.

Mirmira is an international leader in Type 1 diabetes research—specifically the biology of islet cells, which include the beta cells that produce insulin in the pancreases of healthy people, but are attacked by one’s own immune system in people who develop Type 1 diabetes. Among his many achievements, Mirmira’s research studies have led to the discovery and characterization of fast-acting insulin analogs, which are widely used by patients with diabetes today.
He first came to IU in 2008. As director of the Wells Center, Mirmira is charged with leading efforts to increase research collaboration among scientists and physicians to accelerate the development of new approaches to the diagnosis and treatment of childhood diseases, as well as providing an outstanding training environment for students, residents and fellows.

Mirmira succeeded former Wells Center director Mervin C. Yoder, MD, who held the position for the past nine years.

**SCHOOL CELEBRATES OUTGOING CENTER DIRECTORS**

Directors of the IU School of Medicine campuses in Bloomington and Gary are both stepping down from their longtime roles.

John B. Watkins, PhD, associate dean and director of the Indiana University Bloomington Medical Sciences Program, retired in April after 35 years of service to Indiana University. Patrick W. Bankston, PhD, will step down from a similar role at IU School of Medicine-Northwest-Gary effective July 1, though he will continue to serve in other leadership roles at IU Northwest.

“John has shown exemplary leadership of the Bloomington medical education center and was instrumental in laying the groundwork for the new Regional Academic Health Center,” remarked Jay L. Hess, vice president for university clinical affairs and dean of the School of Medicine.

Throughout his career, Watkins has been tireless in his commitment to fostering an interest in science throughout the Bloomington community. He has also published and presented on a number of topics, including the impact of toxicants and antioxidants on hepatobiliary function, hepatotoxicity and xenobiotic biotransformation on livestock and laboratory animals.

Watkins earned his bachelor’s of arts degree in chemistry from Wake Forest University in Winston-Salem, North Carolina. He was a predoctoral trainee at the National Institute of General Medical Sciences School of Pharmacy in Bethesda, Maryland, from 1975-78 while pursuing both his master’s of science and doctor of philosophy degrees in pharmacology at the University of Wisconsin at Madison, which he completed in 1979.

In Gary, Bankston has supported medical education for more than 40 years. He worked his way through the academic ranks at IU School of Medicine-Northwest-Gary, earning the rank of professor of anatomy and cell biology in 1991, with a joint appointment as professor of pathology and laboratory medicine. His research career has focused on capillary structure and function, topics on which he published with the late Nobel Laureate George Palade.

“We are extremely grateful for Dr. Bankston’s many contributions to IU School of Medicine and the community, including major innovations to medical education and his focus on advancing diversity and professionalism,” Hess said. “He leaves very big shoes to fill.”

Bankston will continue as dean of the College of Health and Human Services at IU Northwest, a college he helped found in 2008, with six health and social service-related undergraduate programs. He will also continue his teaching and service roles as a faculty member at IU School of Medicine-Northwest-Gary.

The school will launch national searches to fill both roles. Peter Nalin, MD, is serving as interim director of the Bloomington campus until a successor is named.

**DATA EXPERT FOCUSES ON PRECISION HEALTH**

Kun Huang, PhD, a scientific and academic leader in bioinformatics and computing, joined the faculty in July as director of data sciences and informatics for Indiana University’s first Grand Challenge initiative, Precision Health.

The Precision Health Initiative is a five-year research initiative announced in June 2016 focused on patient-centered precision medicine therapies. Data sciences and informatics represent one of the initiative’s five research clusters across the university. The others are genomic medicine; cell, gene and immune therapy; chemical biology and biotherapeutics; and...
precision to population health.
Huang was previously a professor of biomedical informatics at the Ohio State University, where he also served as associate dean for genome informatics in the College of Medicine and director of the Division of Computational Biology and Bioinformatics.
Huang received bachelor’s degrees in biology and computer science in 1996 from Tsinghua University in Beijing, China. From 1996 to 2004, he studied at the University of Illinois at Urbana-Champaign, where he obtained master of science degrees in molecular and systems physiology, electrical engineering and mathematics, as well as a PhD in electrical and computer engineering.
His research interests include translational bioinformatics and integrative genomics tools for precision health, algorithms and software for mining and visualizing large and complex biomedical data, computer vision, machine learning, medical imaging and computational biology.

**MED STUDENT SERVING AS IU TRUSTEE**

Zachary Arnold was appointed by Indiana Gov. Eric Holcomb to serve a two-year term as a student representative on the IU Board of Trustees. He assumed the role on July 1, 2017.

“I am delighted for the opportunity to work with Zachary, whose appointment continues the practice of choosing IU’s most impressive students to provide a student perspective on the board,” IU President Michael A. McRobbie said.

As an undergraduate, Arnold was a dynamic member of the Bloomington community, both on and off campus. He served in various leadership and volunteer roles, including vice president of the Little 500 steering committee and subcommittee and track manager for the IU Student Foundation; vice president of communications and social chairman for the Indiana Beta Chapter of Sigma Phi Epsilon Fraternity; volunteer child mentor for Templeton Elementary School; and as a certified autism mentor for the Hutton Honors College Autism Mentoring Program.
Arnold also served as a clinical research assistant for the IU Department of Psychology; laboratory technician for the Graph Theoretic Analysis of Brain Networks in Cannabis Users; and medical scribe for Indiana Geriatric Associates, among other positions.

**IN MEMORIAM | GEORGE LUKEMEYER, MD**

George Lukemeyer, MD, IU School of Medicine alumnus and long-time faculty member, died on Feb. 25, in Bloomington, Indiana, at the age of 93. Lukemeyer served on the school's admissions committee for more than 40 years, 18 of those years as chairman.

Responsible for admitting hundreds of students during his tenure, Lukemeyer saw beyond grades and test scores, talking to would-be physicians about their interest in medicine and forcing them to look ahead to where they’d like to be in 10 or 15 years.

“I’m convinced this is a terribly important job,” Lukemeyer said in a 2010 *IU Medicine* story. “The kinds of people you select in will determine the kinds of people you graduate out.”

Lukemeyer graduated from IU School of Medicine in 1947. He joined the faculty in 1954 and rapidly rose through the ranks, eventually overseeing the administration of IU and Riley hospitals as the school’s executive associate dean.

He also made significant contributions to research and patient care. As a young faculty member, Lukemeyer established the school’s first kidney dialysis unit.

The Lukemeyer name will forever be associated with excellence in medical education. The endowed Frank C. and Ruby L. Moore and George T. Lukemeyer Professorship was established to benefit IU School of Medicine. In addition, two endowed scholarships bear his name: The Class of 1970 David M. Gibson and George T. Lukemeyer Scholarship, and the George T. Lukemeyer Medical Student Scholarship.

**FORMER INDY MAYOR TAKES HELM OF KENYA BOARD**

Bart Peterson, former Indianapolis mayor and Eli Lilly and Company executive, is helping the IU Center for Global Health continue to improve health worldwide as chair of the center’s development board. In this volunteer role, Peterson leads the development board’s work to advocate and raise funds for IU’s global health partnerships, such as the Academic Model Providing Access to Healthcare (AMPATH).

Peterson recently retired as senior vice president of corporate affairs and communications for Eli Lilly and Company, where he also served as a member of the company’s executive committee. From 2000 to 2007, Peterson served two terms as mayor of Indianapolis. He also served as president of the National League of Cities in 2007.

Peterson has served as a member of the Center’s development board since 2015.
Too often, we wisely stuff as much tax-deferred income into our 401k/403b retirement plans as possible. But certain factors can affect how much money is available when it’s time to retire. The value of these plans can be reduced by periodic declines in the financial markets, sometimes leaving us with less income to live on than we had hoped. In addition, each distribution is subject to income taxes.

The same is true for after-tax investment accounts, another common saving tool. Like retirement accounts, investment accounts are exposed to the ups and downs of the market. And some distributions may be subject to income taxes or capital gains tax.

But did you know that there is a charitable solution to help stabilize your retirement income? Creating a deferred charitable gift annuity (DCGA) today provides you with a more predictable income stream later during your retirement years.

The annuity payments from a DCGA are not endangered by declines in the financial markets. The size of your annuity payments never decreases. Plus only a portion of your annuity payments are subject to income taxes. Over the years, I have worked with many folks who have funded a DCGA because they wanted to stabilize retirement income.

Most recently, I worked with a couple I’ll call Dr. & Mrs. Smith. Both are 64 years old. At the end of 2017, the Smiths made an irrevocable gift to fund a DCGA with $250,000 in cash. It generated a hefty charitable income tax deduction of $41,707. Dr. Smith intends to retire in 2022, so they deferred the start of their payments for five years. By deferring the start of their payments, they obtained a higher annuity rate.

In this instance, the five-year deferral caused the Smiths’ annuity rate to climb to 6.6%. That means in the year 2022 when Dr. Smith retires, their annual payment will be $16,500. Of this amount, only $6,765 is taxed as ordinary income, whereas the remaining $9,735 is received tax-free. The Smiths can rely on receiving their $16,500 every year regardless of how the financial markets perform. That’s because the DCGA is backed by the assets of the Indiana University Foundation.

When their DCGA terminates after they both have passed, the remaining assets will go toward funding an Alzheimer’s research endowment that will forever bear their names. They chose to support Alzheimer’s research because Mrs. Smith’s father had recently passed away after having suffered from this disease. So they can stabilize their retirement income and create a lasting family legacy.

If you recognize that a large portion of your retirement income will be subject to income taxes and will be exposed to periodic declines in the financial markets, you may find comfort in knowing that a charitable solution exists. Creating a DCGA now, and deferring the start of your annual annuity payments until the year you expect to retire, could be the solution you have been looking for.

Tim W. Ueber is the director of planned giving at IU School of Medicine. He has nearly 20 years of experience helping individuals and families with their estate and charitable planning needs. He may be reached at 317-274-0187 or twueber@iu.edu.
THANK YOU

Coach Chuck Pagano is an incredible champion for cancer patients and cancer research. That’s why Indiana University School of Medicine is proud to team up with the Indianapolis Colts and many other generous donors to raise more than $800,000 to establish the Chuck and Tina Pagano Cancer Research Fund. The endowed fund will fuel life-saving discoveries and ensure the Paganos’ names will permanently be connected to research breakthroughs at IU.

We are forever #CHUCKSTRONG.

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