



Northwestern Medicine

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SUMMER 2019

Designed for Discovery

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BIOMEDICAL
RESEARCH CENTER
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Delivering the Clinical Experience

5TH ANNUAL SIMULATION OPEN HOUSE

David Salzman, MD, MEd, director of simulation for undergraduate medical education, walks participants through the delivery of a baby using SimMom®, one of Feinberg's high fidelity simulators that is able to simulate labor and help learners improve maternal and neonatal outcomes. Clinical simulation provided training and education to more than 9,000 learners last year.

Northwestern Medicine magazine is published quarterly for alumni and friends of Northwestern University Feinberg School of Medicine, Northwestern Memorial HealthCare, and the McGaw Medical Center of Northwestern University.

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PHOTOGRAPH BY Teresa Crawford

Features



BRAIN, HEART & COURAGE

A unique collaboration between a neurosurgeon and a cardiac electrophysiologist leads to a life-saving brain surgery for a young mother.



DESIGNED FOR DISCOVERY

A look inside the new, modern building that will lead to scientific advances that change human health.



UNTANGLING ALZHEIMER'S

Northwestern investigators view this devastating disease in a new way — as a spectrum model — and dig into its roots for a cure.



NO SMALL PLANS

With big ambitions to stop kidney disease, Susan Quaggin, MD, leads efforts on multiple fronts — in the lab and beyond.

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ON THE COVER
The new Louis A. Simpson and Kimberly K. Querrey Biomedical Research Center, the largest new building dedicated to biomedical research at a U.S. medical school.

Innovation Accelerating Discovery and Care

THERE IS NO BETTER TIME THAN NOW TO CONTEMPLATE the extraordinary potential for Northwestern Medicine's future. This year, several focused investments have become a reality and will establish new platforms for accelerating innovation to advance our clinical, research, and teaching missions.

We believe innovation thrives at the intersection of people, processes, and technology. Today, we could not ask for a better symbol of this interplay than the new Louis A. Simpson and Kimberly K. Querrey Biomedical Research Center, which opened in June. The culmination of a seven-year journey to create a larger footprint for discovery on our Chicago medical campus, this marvelous feat of innovation will allow scientists to make discoveries that impact the practice of medicine and improve human health for years to come. This bold vision came to life thanks to the determination of countless people across our enterprise and beyond, from generous donors to strategic leaders to our dedicated staff and scientists.

Innovations in process were baked in from day one. The earliest architectural blueprints revolved around supporting the scientific process, which flourishes with collaboration. From the creation of a floor-by-floor connection to the Robert H. Lurie Medical Research Center and a bridge to the Searle Medical Research Building, to the two-story gathering spaces within the biomedical research center itself, the key word here is connection. Because world-changing discoveries are rarely made in silos.

You will see technology everywhere in this building, starting from the façade — a double-layered glass wall with adjustable metal shades and a mechanical system that can exhaust hot air, and thus reduce energy bills. Inside, technology aids discovery. On the seventh floor, scientists at the Simpson Querrey Center for Epigenetics are using sophisticated molecular, biochemical, and computational methods to understand the effects of environment on the regulation of genes. On the eighth floor, at the George M. O'Brien Kidney Research Core Center,

scientists are developing a bioengineered kidney and pancreas, and the Department of Cell and Developmental Biology will begin a new era for studies regarding structure and function. On the fifth floor, in the Center for Genetic Medicine, scientists are developing a "super glue" protein that helps reseal and repair damaged muscles, and the Division of Pulmonary and Critical Care is reimagining new approaches to inflammation and fibrosis of the lung. On the sixth floor, the brain tumor program will be refining cutting-edge science for attenuating brain tumors. And all of this is just the beginning.

The Simpson Querrey Biomedical Research Center (which you can read all about on page 18) may be our newest symbol of innovation, but it's certainly not the only one. A legacy gift continues to support innovation today. The Dixon Translational Research Fund offers two types of awards aimed at catalyzing the cutting-edge translational science happening across the Northwestern Medicine scientific ecosystem. The Dixon Young Investigator and Innovation Awards fund meritorious projects that are poised to make the leap to first-in-human studies or to fund applications of ideas that can be quickly translated to the healthcare setting. A Dixon Award was recently presented to Bruce Bochner, MD, whose lab uncovered how a lymphoma drug could be leveraged to desensitize individuals with allergies.

The Innovation Award has been established to accelerate and foster ideas to transform patient care. Through this award, Northwestern Medicine will spread the culture of innovation across the health system, empowering employees to be part of transforming healthcare, while also collaborating with those entrepreneurs and organizations outside of Northwestern Medicine who share the same passion for the future of healthcare.

After completing the installation of a single instance of an electronic medical record across the health system, we are now poised for accelerating innovation in technology to support our patients and caregivers. Some recent examples include the MyNM app to enable patients, caregivers, and consumers to connect with our



health system from anywhere, at any time. We have also expanded telehealth and digital care through TeleStroke, TeleSleep, and TeleOphthalmology offerings. And to help address a major care barrier for some patients, we now offer a digital healthcare logistics and technology platform for Non-Emergent Medical Transportation that streamlines the process of scheduling medical transportation for patients who lack access to reliable transport. The Innovation Fund will allow us to sustain these and other efforts.

Innovation is also present in Feinberg's medical education, which includes the use of artificial intelligence in medical decision-making; new classroom design; the use of augmented, virtual, and extended reality to bring anatomy to life; and the expansion of education to the community to impact the quality of patient care, address social determinants, and improve overall health. On page 30, you can see members of the class of 1969 (among others) marveling at some of these new developments at our recent Alumni Weekend.

Northwestern Medicine is at an important inflection point to lead transformational activities in discovery and delivery of care. We understand on a deep level that human lives depend on innovation. And that is why we remain steadfastly committed to continuous innovation for improvement.

With warm regards,

Eric G. Neilson, MD
Vice President for Medical Affairs
Lewis Landsberg Dean

Dean M. Harrison
President and CEO
Northwestern Memorial HealthCare

ON CAMPUS

A New Home for Discovery

The June 17 dedication of the Louis A. Simpson and Kimberly K. Querrey Biomedical Research Center marked the official opening of the largest new research building in the United States. A capacity crowd of Northwestern leadership, trustees, faculty, staff, friends, and supporters gathered to usher in a new era of scientific discovery. Following the opening dedication, attendees heard presentations by Northwestern University faculty inside the Potocsnak Family Atrium.

- 1

U.S. Senator Dick Durbin.
- 2

Northwestern University Trustee Ann Lurie and Northwestern University president and professor Morton Schapiro.
- 3

Top row, from left: Former Chicago Mayor Rahm Emanuel; Northwestern University Board of Trustees Chairman J. Landis Martin; Morton Schapiro; Illinois Gov. J.B. Pritzker (also 6); Northwestern University Trustee Louis A. Simpson (also 4); Northwestern University Trustee Kimberly K. Querrey (also 4); Northwestern University Feinberg School of Medicine Vice President for Medical Affairs and Lewis Landsberg Dean Eric G. Neilson, MD (also 5); Northwestern University Provost Jonathan Holloway; John Potocsnak and Laura Potocsnak.
- 7

Patrick Magoon with Stanley Manne and Fern Lentini Manne; Tom Brian Shanley, MD, chair of Pediatrics at Feinberg and Lurie Children's and president and chief research officer of the Stanley Manne Children's Research Institute; and Cassandra Lucas, PhD, CRA, COO of the Stanley Manne Children's Research Institute.
- Bottom row, from left: Ald. Brian Hopkins, 2nd; Northwestern Memorial Healthcare CEO Dean Harrison; Stanley Manne; President and CEO of Ann & Robert H. Lurie Children's Hospital of Chicago Patrick Magoon; Illinois State Senator Robert Peters; and Illinois Congressman Danny Davis.



PHOTOGRAPHY BY Nathan Mandell

Meet the Class of 2019

As Roey Fuller, '19 MD, '19 MBA, prepared to cross the stage and receive her diploma, she thought back to those who supported her during her Feinberg journey. "There were definitely moments when I questioned myself, especially as a new mom. But I am so proud to be able to say that I made it, with my baby on my hip and my husband at my side," said Fuller, who will begin a residency in pediatrics this fall at Ann and Robert H. Lurie Children's Hospital of Chicago. She credits her mentors at Feinberg, particularly

Angira Patel, MD, MPH, '10 '11 GME, associate professor of Pediatrics in the Division of Cardiology and of Medical Education. "She was a great counselor on how to be a mom in medicine," Fuller said. Eric G. Neilson, MD, vice president for Medical Affairs and Lewis Landsberg Dean, welcomed graduating medical students, faculty, family, and friends to the ceremony, held May 20 in the Aon Grand Ballroom at Navy Pier. "As I reflect on the extraordinary things you have accomplished so far, I am reminded you are

also embarking on a new stage in your life as students of medicine," Neilson said. "This stage is more personal and reflective, where you quickly become your own teacher and set goals for what you will remember and refresh through years of continuing medical education." Following Neilson, Jonathan Holloway, PhD, provost of Northwestern University, spoke about students' personal growth and the friendships they forged along the way. Holloway then introduced Talmadge King, Jr., MD, dean of University of California, San Francisco School of Medicine, who delivered the commencement address, emphasizing the need to address healthy inequality. Then, Marianne Green, MD, senior associate dean for Medical Education, presented the members of the class of 2019. The newly minted physicians received their diplomas and doctoral hoods from a fellow physician, usually a mentor or family member.



MD
Roey Fuller, '19 MD, '19 MBA, with her son, Henry.



PT
Olivia Dyer, who earned her DPT, with her family.

MD JOINT DEGREES

11 earned a PhD in the Medical Scientist Training Program

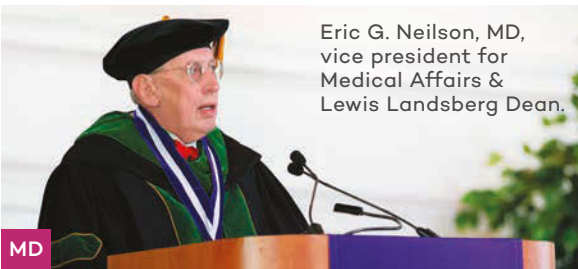
6 received a Master's Degree in Business Administration

3 earned a Master's Degree in Medical Humanities and Bioethics

6 received a Master's Degree in Public Health



MD
← Courtney Browne was voted by her classmates to address the audience. She was the class's representative for the Illinois Academy for Physician Assistants and the first Feinberg PA student to complete a global rotation (in northwest India).



MD
Eric G. Neilson, MD, vice president for Medical Affairs & Lewis Landsberg Dean.



PT
The Physical Therapy program's graduation ceremony was also held at Navy Pier, with 93 graduates receiving their diplomas.



During the 2018-2019 academic year, the Feinberg School of Medicine Office of Diversity and Inclusion welcomed 16 Northwestern undergraduate students on their spring break for the second year of the NU DOCS program.

Inspiring Future Physicians and Scientists

Northwestern hosts a variety of programs that engage young learners in STEM (science, technology, engineering, and math) education activities and help them explore the many career opportunities in medicine and biomedical research.

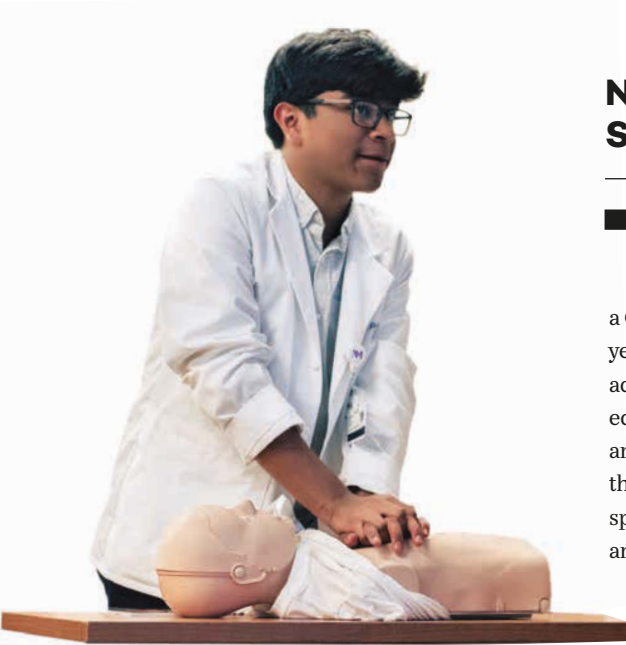
“The path to medical school can be challenging for even the most supported students,” says Clyde Yancy, MD, MSc, vice dean for Diversity and Inclusion and chief of Cardiology in the Department of Medicine. “Building a pipeline of diverse learners from many different backgrounds is critical to ensure tomorrow’s medical and scientific professionals mirror the communities in which we serve.”

NU DOCS

The Feinberg pipeline program, NU DOCS, is designed to mentor aspiring Northwestern University undergraduate students from underrepresented groups who are interested in a career in medicine. The program, organized as an alternative spring break learning activity, provides students with a full week of premedical advising, skill-building workshops, clinical experiences, and discussions with faculty members.

NM Discovery Program

The mission of Northwestern Medicine Discovery is to create a pathway for the next generation of Northwestern Medicine leaders by drawing on the talents of the incredible team of healthcare professionals at Northwestern Medicine to provide STEM career exposure throughout two years of a student’s high school career. Throughout the program, students are exposed to a broad range of activities designed to encourage their interest in healthcare careers.



Northwestern Medicine Scholars Program

This unique program targets under-resourced students from George Westinghouse College Prep, a Chicago Public High School. It is a four-year pipeline program founded in 2010 to address the pipeline concerns in STEM education among African American, Latino, and low-income students. Each summer, the Northwestern Medicine Scholars spend four weeks on campus in didactic and interactive lectures and experiences.

Through exposure to a variety of activities, selected students learn from leading physicians and scientists to inform their career decisions.

Cancer Undergraduate Research and Education Program

The Cancer Undergraduate Research and Education (CURE) program at the Lurie Cancer Center of Northwestern University aims to bring greater diversity to the biomedical research community. Established in 1999, CURE selects talented undergraduate students from underserved populations to participate in a mentored training and career development program on the Chicago and Evanston campuses. For eight weeks, students work full time alongside top cancer scientists in state-of-the-art laboratories. Senior scientists act as mentors and work with CURE students on nationally funded laboratory research projects. Students are introduced to the basics of cancer biology and receive career guidance through weekly seminars presented by faculty members.



Health Professions Recruitment and Exposure Program (HPREP)



The Health Professions Recruitment and Exposure Program (HPREP) is a five-week educational and exposure program for high school students of diverse backgrounds. Hosted by the Feinberg Office of Diversity and Inclusion, the program’s goal is to provide students first-hand exposure to the Feinberg medical curriculum, career options in health-care, tools for academic success, and opportunities to interact with current medical students, physicians, nurses, and other healthcare professionals. Two students groups, the Student National Medical Association (SNMA) and the Latino Medical Student Association (LMSA), spearheaded the program at Feinberg.

Women’s Health Science Program

The Women’s Health Research Institute at Northwestern University fosters the next generation of female leaders in science and medicine through the Women’s Health Science Program, which provides hands-on laboratory and clinical experiences to young women who are considering careers in science and medicine.



Lincoln Park High School student Emmy Alvarez, left, and Jones College Prep student Ada Okolo learn about the physical properties of biomaterials. The Office of Research Safety donated lab coats for the 2018 Women’s Health Science Program.



Whitney Young High School student Daisy Jungo, left, and Kenwood Academy High School student Hailey Johnson test their hand-eye coordination using laparoscopic surgical equipment in the Northwestern Simulation Lab.

Northwestern Scientists Investigate Gut Microbiome for NASA Twins Study

Mark Kelly (left) provided a baseline for observation on Earth, and Scott Kelly (right) provided a comparable test case in space.



When, four years ago, NASA astronaut Scott Kelly launched into space to spend a year in orbit, Northwestern University scientists (along with nine other NASA-funded groups across the country) launched a fascinating experiment. Kelly was half of it; the other half was his identical twin, Mark — also an astronaut — who remained on Earth as a ground-based control.

All of the investigators involved with the experiment were studying how living in space affects the human body, including changes in gene expression, bone density, immune system responses, and telomere dynamics. The Northwestern scientists, led by Fred Turek, PhD, professor in the Ken and Ruth Davee Department of Neurology, and of Psychiatry and Behavioral Sciences, focused on how outer space affects the microbiota “ecosystem” in the human gastrointestinal (GI) tract. All ten studies were published in one comprehensive paper in *Science*.

“This multi-system, integrated analysis over time is one thing that makes the Twins Study unique and powerful,” said Martha Vitaterna, PhD, the first author of the Northwestern study. “We can see which things change together in the human body.”

Turek and his team’s study found that extended spaceflight does affect the human gut microbiome. During his stay on the International

Space Station (ISS), astronaut Scott Kelly experienced a shift in the ratio of two major categories of bacteria in his gut microbiome. The diversity of bacteria in his microbiome, however, did not change during spaceflight, which the Northwestern University-led research team found encouraging.

“We cannot send humans to Mars without knowing how spaceflight affects the body.”

FRED TUREK, PHD

The investigators collected two fecal samples from Scott Kelly before he left for space, four during the year in space, and three after he returned to Earth.

“We did compare Scott with Mark, which was interesting,” said Turek. “But the real comparison was looking at Scott’s samples from before, during, and after flight. That’s probably the most valuable information we have.”

More than 90 percent of the gut’s bacteria belong to one of two broad categories: Firmicutes or Bacteroidetes. Both categories contain a mix of both good and bad bacteria. The ratio between Firmicutes and Bacteroidetes in Scott Kelly’s microbiome experienced a pronounced shift during spaceflight — the number of Firmicutes increased while Bacteroidetes decreased. This shift was among the greater compositional change that the investigators noted in Scott Kelly’s microbiome, which returned to normal after he came back to Earth.

“There was some kind of wholesale shift in remodeling of the structure of this community of microorganisms,” Vitaterna said. “We cannot say whether it’s good or bad.”

WHAT CAUSED THE SHIFT?

A number of variables could have influenced Scott Kelly’s microbiome while in space, including microgravity, increased radiation, shifts in circadian rhythms, decreased sleep time, lack of air circulation, the stress of living in an enclosed space, and an altered diet. Turek and Vitaterna were concerned that Scott Kelly’s diet in space, which comprised mostly freeze-dried, irradiated, pre-packaged foods, would decrease the diversity in his microbiome. Initially, diet does not appear to matter as much as the scientists worried.

This result mirrored mouse studies the Northwestern pair conducted in the past. Whereas Scott and Mark Kelly did not eat the same foods during the yearlong study, mice in previous studies ate the exact same diet. Still, the space mice experienced shifts in their gut microbiomes compared to the control mice on Earth.

Turek believes microgravity’s effect on bacteria is most likely responsible for the change. “That’s what we want to determine going forward,” he said.

The study’s finding could help physicians and scientists pinpoint and implement ways to protect astronauts’ and space tourists’ microbiomes during long bouts of space travel, such as during the much-anticipated mission to Mars. These countermeasures could include pre-, pro- and postbiotics.

“We cannot send humans to Mars without knowing how spaceflight affects the body, including the microbes traveling with humans to Mars,” said Turek. “And we need to know sooner rather than later. The plan is to send people to Mars in 2035, so we cannot wait until 2033 to gain this information.”

Turek and Vitaterna collaborated with investigators from the University of Illinois at Chicago and Rush University Medical Center in Chicago.

CONFERENCE EXPLORES EPIGENETICS

Feinberg welcomed some of the biggest names in science to campus this past June, partnering with *Nature Genetics* and *Nature Medicine* to host the Chicago Science 2019: Epigenetics and Genome Editing conference. Leaders in the field and young investigators gathered to learn the nuts and bolts of gene regulation, and find out how to use new tools that will fuel the next generation of epigenetic discoveries.

George Church, PhD, professor of Genetics at Harvard Medical School, delivered a keynote presentation about a new method to edit the genomes of multiple cells at once, using a new kind of CRISPR-Cas9 editing.

In traditional CRISPR editing, the DNA is cut with “molecular scissors” at a specific site, enabling scientists to switch genes off or insert new sequences. With this new method, called multiplex editing, investigators can simply swap one codon for another, for example, turning C and G pairings into T’s and A’s. This is both cheaper and more efficient for editing multiple genes at once, Church explained.

“It’s not automation or parallelization of processes, as you might think — we could fill up this room with sequencing devices and it doesn’t save money,” Church said. “What saves time and money and allows us to do new things is if we could put a hundred to a trillion different reactions in a droplet, and these reactions

George Church, PhD, professor of Genetics at Harvard Medical School, delivered the keynote presentation.



can evolve through molecules, cells, and so on.”

This is another step towards large-scale genome editing, according to Church, who envisions genetically engineered cells that could resist viral infections, or modified animal organs for transplantation into humans, which could help alleviate the longstanding problem of transplant organ shortage.

At another talk at the conference, Ali Shilatifard, PhD, chair of Biochemistry and Molecular Genetics and director of the Simpson Querrey Center for Epigenetics, highlighted how the field has changed since his original discovery of gene transcription’s role in cancer more than 20 years ago.

“My main interest in the lab for the past 25 years was the process of regulation and gene expression,” Shilatifard said. “Now we can take advantage of the awesome power of genetic chemistry in an organism to address the question: Why does translocation cause leukemias?”

Other Feinberg participants included Alfred George, Jr., MD, chair and Magenstadt Professor of Pharmacology; Dimitri Krainc, MD, chair of the Ken & Ruth Davee Department of Neurology; the Aaron Montgomery Ward Professor and director of the Center for Neurogenetics; and Elizabeth McNally, MD, PhD, the Elizabeth J. Ward Professor of Genetic Medicine and director of the Center for Genetic Medicine.



The event was one of the first hosted at the Louis A. Simpson and Kimberly K. Querrey Biomedical Research Center.

RESEARCH BRIEFS

DISEASE DISCOVERIES

Newly Discovered Protein Explains Leukemia’s Treatment Resistance

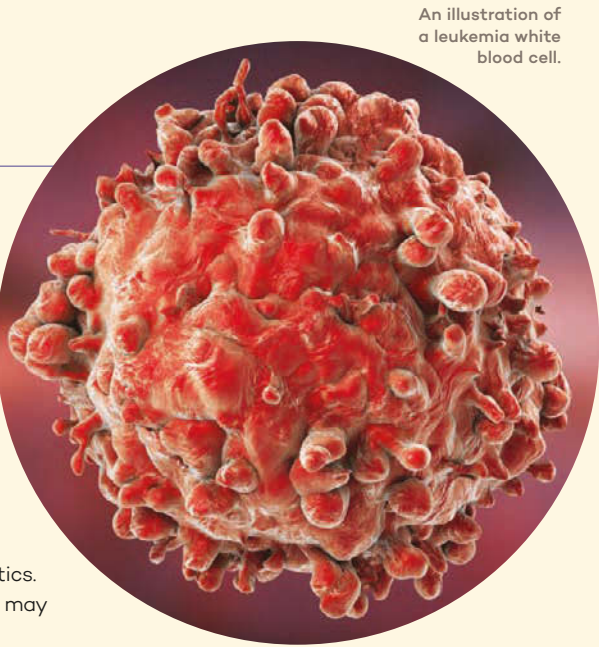
 An overactive protein complex that helps drive the development of leukemia may explain why many therapies for the cancer have proven ineffective, according to a new Northwestern Medicine study published in the journal *Blood*.

Another complex, called mTORC, is often upregulated in leukemia but was previously believed to be the only one exhibiting this behavior — until the current study, when Northwestern scientists discovered a never-before-seen counterpart, called cTORC. This newly identified complex has a similar function, and its existence may explain why cancer therapies targeting only mTORC have been unsuccessful thus far, according to

Leonidas Platanias, MD, PhD, the Jesse, Sara, Andrew, Abigail, Benjamin and Elizabeth Lurie Professor of Oncology, director of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University and senior author of the study.

“The treatments may not work because they’re only targeting half of this pathway,” said Platanias, who is also a professor of Medicine in the Division of Hematology and Oncology and a professor of Biochemistry and Molecular Genetics. “Instead, targeting both complexes together may be much more effective in fighting cancer.”

This work was supported in part by National Institutes of Health, National Cancer Institute (NCI) grants CA121192, CA77816 and CA189074, and by grant IO1CX000916 from the Department of Veterans Affairs.



An illustration of a leukemia white blood cell.

SCIENTIFIC ADVANCES

CONNECTION BETWEEN CIRCADIAN RHYTHM AND HUNGER DISCOVERED

 Northwestern Medicine scientists have explained how circadian rhythm regulates hunger, a long-suspected connection that was confirmed by the study published in *Cell Metabolism*.

The scientists traced the regulation to a group of neurons in the hypothalamus, a brain region that coordinates autonomic functions like body temperature, thirst, and hunger. “We identified one of the places in the brain where the drive for hunger is coordinated when you’re awake and when you’re asleep,” said Joseph Bass, MD, PhD, the Charles F. Kettering Professor of Medicine in the Division of Endocrinology, director of the Center for Diabetes and Metabolism, and senior author of the study. “It’s sort of like a relay station.”

Mammalian circadian rhythm is regulated by a complex gene transcription feedback loop, a Nobel-prize winning discovery that evolved from initial findings of Northwestern studies



published in the 2000s. Specialized cells detect light or darkness, and through gene transcription set a day and night cycle that influences a variety of functions. While earlier studies

had hinted at how circadian rhythm regulated hunger, the exact molecular pathway was unknown.

“We didn’t know much about how that timing process influenced our appetite or how the body metabolizes what we eat,” said Bass, who is also a member of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University.

In the current study, Bass and his colleagues zeroed in on a population of neurons in the hypothalamus, called AgRP neurons. These neurons are “central command” for hunger, Bass said, and integrate a variety of signals before “broadcasting” hunger or satiation to the rest of the brain.

The study was supported by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) grants R01DK090625, R01DK113011, R01DK100814, and P01DK049210; the National Institute on Aging grant P01AG011412; the National Institute of Mental Health grant R01MH110556; the Chicago Biomedical Consortium S-007; the University of Chicago Diabetes Research and Training Center grant P60DK020595; the NIDDK award K01DK105137-02; the Swedish Research Council grant 2014-6888; and the Swedish Society for Medical Research.

CLINICAL BREAKTHROUGHS

Key Findings in Cancer Care for Women

 Daniela Matei, MD, participated in two recent studies that impact cancer care for women. The first affects treatment for stage III/IVA endometrial cancer following surgery, for which the standard of care has been chemotherapy and radiation to prevent recurrence. But in a surprising new study, led by Matei, radiation combined with chemotherapy did not increase recurrence-free survival.

70% OVARIAN CANCER PATIENTS RELAPSE

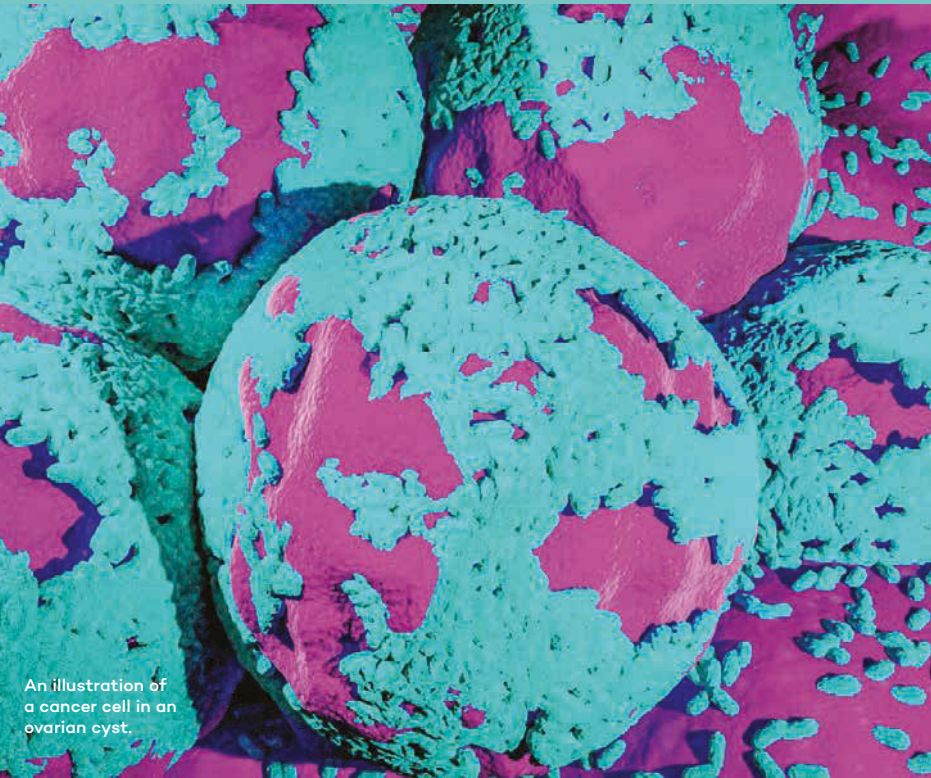
“The trial was supposed to be a positive trial demonstrating that the combined regimen was superior to chemotherapy given alone,” said Matei, who is the Diana, Princess of Wales Professor of Cancer Research, a professor of Medicine in the Division of Hematology and Oncology and a Northwestern

Medicine gynecological oncologist. But, results indicated that chemotherapy alone remains the standard of care for stage III uterine cancer, the most common gynecologic cancer, with most cases occurring in women after age 55. The findings were published in the *New England Journal of Medicine*.

Matei was also co-author of a phase II trial published in *The Lancet Oncology* finding that a drug called niraparib showed clinically relevant activity in women with relapsed ovarian cancer who had exhausted all previous treatment options. While many patients will initially respond to therapy, about 70 percent will eventually relapse. “The results of this study provide a new treatment option for women with recurrent ovarian cancer,” she said.

 Listen to a podcast with Matei at feinberg.northwestern.edu.

The uterine cancer study was supported by grants CA 27469, CA 37517, 1U10 CA180822, U10CA180868 and UG1 CA189867 from the National Cancer Institute of the National Institutes of Health. The ovarian cancer study was funded by Tesaro, which manufactures niraparib. Matei reported receiving personal fees from Tesaro outside the current study.



An illustration of a cancer cell in an ovarian cyst.

CLINICAL BREAKTHROUGHS

VITAMIN D SHOWS BENEFIT IN ADVANCED COLORECTAL CANCER

 Supplementing chemotherapy with vitamin D may improve progression-free survival in patients with advanced colorectal cancer, according to the results of a clinical trial published in *JAMA*.

“This is a very impressive study showing the feasibility of implementing a high dose of oral vitamin D intervention, in combination with standard chemotherapy,” said co-author Halla Nimeiri, MBBS, health



system clinician of Medicine in the Division of Hematology and Oncology and at the Robert H. Lurie Comprehensive Cancer Center of Northwestern University.

Laboratory studies have previously demonstrated the anti-cancer properties of vitamin D, and observational studies have also found an association between vitamin D and a decreased risk of colorectal cancer. However, there has been limited data from prospective trials of patients with advanced disease, according to Nimeiri.

The SUNSHINE study is the first randomized clinical trial of vitamin D supplementation in patients with advanced or metastatic colorectal cancer.

The study, led by investigators at the Dana-Farber Cancer Institute, was supported by grants P50CA127003, R01CA205406 and R01CA118553 from the National Cancer Institute of the National Institutes of Health. Additional funding was provided by the Gloria Spivak Faculty Advancement Award, Friends of Dana-Farber Cancer Institute Award, Project P Fund, Consano, Pharmavite LLC, and Genentech. Pharmavite provided the vitamin D3 and placebo capsules for the study.

MEDIA SPOTLIGHT

The New York Times

A.I. Took a Test to Detect Lung Cancer. It Got an A.

Computers were as good or better than physicians at detecting tiny lung cancers on CT scans in a study conducted by Google and several medical centers, including Northwestern Medicine. By feeding huge amounts of data from medical imaging into systems called artificial neural networks, investigators can train computers to recognize patterns linked to a specific condition, according to Mozziyar Etemadi, MD, PhD, research assistant professor of Anesthesiology, and co-author of the study, which was published in *Nature Medicine*. Tested against 6,716 cases with known diagnoses, the system was 94 percent accurate.



As HIV Patients Live Longer, Heart Disease Might Be Their Next Challenge.

Medical therapy has transformed HIV from a terminal illness into a chronic, manageable condition. But as people with HIV live longer, they also find themselves at higher risk for heart attack, stroke, and other types of cardiovascular disease. A new American Heart Association (AHA) report hopes to raise awareness about that connection, along with pointing out cardiovascular disease prevention and treatment strategies for an emerging population with unique concerns investigators have only begun to explore. “The fact that people with HIV are living long enough to have chronic, aging-related diseases like heart disease reflects the effectiveness of contemporary HIV therapy. Life expectancy has gotten much longer than it used to be,” said Matthew Feinstein, MD, assistant professor of Medicine in the Division of Cardiology and Preventive Medicine, in a scientific statement published in the AHA journal *Circulation*.



PHOTOGRAPHY BY Julia Manga

Why Do People Love Coffee and Beer? It's the Buzz, Not the Taste, Study Finds.

A team of scientists at Northwestern found that the taste preferences for bitter or sweet beverages aren't based on variations in taste genes, but, rather, in genes that are involved with emotional responses. The results of the study are published in the journal *Human Molecular Genetics*. “The genetics underlying

our preferences are related to the psychoactive components of these drinks,” said Marilyn Cornelis, PhD, assistant professor of Preventive Medicine in the Division of Nutrition and co-author of the study. “People like the way coffee and alcohol make them feel. That’s why they drink it. It’s not the taste.”



Heart Problems Are Killing More Americans – Even Younger Ones. Here's How to Reduce Your Risk.

Heart disease is, and has for years been, the leading cause of death among American men and women. But for decades, medical and therapeutic advances were enough to drive down cardiovascular death rates. More recently, however, that progress has stalled and the trend has begun to reverse, with certain populations seeing rising rates of some heart issues. In a new research letter published in the *Journal of the American College of Cardiology*, which was based on national death certificate data, investigators charted an increase in heart-failure-related cardiovascular death rates among younger adults



(those ages 35 to 64) over the last decade. The most dramatic increases were among black Americans, the investigators found. Those increases may be at least partially due to the epidemics of obesity and Type 2 diabetes, says co-author Sadiya Khan, MD, MSc, assistant professor of Medicine in the Division of Cardiology and Preventive Medicine in the Division of Epidemiology. “The growing prevalence of obesity and diabetes is now outweighing the progress we’ve made,” in terms of medications, treatments, and surgical procedures.

FACULTY AWARDS & HONORS



Four faculty were inducted into Northwestern's chapter of the Alpha Omega Alpha (AOA) during a ceremony on March 12:

• **James Chandler, MD, '96 GME**, the Lavin/Fates Professor of Neurological Surgery and co-director of the Northwestern Medicine Lou and Jean Malnati Brain Tumor Institute of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University at Northwestern Memorial Hospital 1

• **Aarati Didwania, MD**, associate professor of Medicine in the Division of General Internal Medicine and Geriatrics, and director of the Honors Program in Medical Education 2

• **Karen Ho, MD**, associate professor of Surgery in the Division of Vascular Surgery 3

• **David Odell, MD, MMSc**, assistant professor of Surgery in the Division of Thoracic Surgery

Four faculty were honored during the seventh annual Honors Day on May 17:

• **James Walter, MD, '17 GME**, assistant professor of Medicine in the Division of Pulmonary and Critical Care; **Eugene Silinsky, PhD**, professor of Pharmacology; and **Susan Goldsmith, MD, '08 GME**, assistant professor of Obstetrics and Gynecology and of Medical Education, received the George H. Joost Teaching Award. 4 (Goldsmith)

• **Suzanne Schmidt, MD, '09 GME**, assistant professor of Pediatrics in the Division of Emergency Medicine, received the Michael M. Ravitch Award for outstanding teaching in a small-group setting.

Deborah Clements, MD, chair and Nancy and Warren Furey Professor of Community Medicine, was elected as president of the Association of Family Medicine Residency Directors (AFMRD). Clements will serve as AFMRD president for 2019–2020 and immediate past president in 2020–2021. Clements joined the AFMRD Board of Directors as Member-at-Large in 2016. As a member of the board she has served in numerous roles, including Membership Committee Chair, Organization of Program Directors (OPDA) Liaison, Finance Committee member, ACGME Milestones 2.0. Committee, and Length of Training Pilot Liaison. 5

Arthur Prindle, PhD, assistant professor of Biochemistry and Molecular Genetics, was named a Pew Biomedical Scholar. Prindle will receive a four-year, \$300,000 grant to study

the genetic signals that prompt bacteria to migrate from densely-packed communities called biofilms. Prindle joins 21 other junior faculty from institutions across the U.S. who were selected by the Pew Charitable Trust for their promise in contributing to science relevant to human health.

Mark Huffman, MD, MPH, '09 GME, the Quentin D. Young Professor of Health Policy and associate professor of Preventive Medicine in the Division of Epidemiology, has been named a 2019 Emerging Leaders in Health and Medicine Scholar by the National Academy of Medicine.

William McGaghie, '73 PhD, professor of Medical Education and Preventive Medicine, has received the 2019 John P. Hubbard Award from the National Board of Medical Examiners (NBME).

The Hubbard Award is given annually to individuals who have made outstanding contributions to the field of evaluation in medicine; NBME noted McGaghie's nearly 40-year career investigating and improving medical education, with many notable discoveries during his time at Feinberg.

Jaehyuk Choi, MD, PhD, the Ruth K. Freinkel, MD, Research Professor of Dermatology and Biochemistry & Molecular Genetics, was selected to receive a 2019 Young Investigator Award from the National Comprehensive Cancer Network (NCCN) and the NCCN Foundation. 6

Linda Teplin, '75 PhD, vice chair for Research and the Owen L. Coon Professor of Psychiatry and Behavioral Sciences and a professor of Medicine in the Division of Infectious

Diseases, was named the 2019 Paula H. Stern Award for Outstanding Women in Science and Medicine by the Feinberg Women Faculty Organization. 7

Karl Bilimoria, MD, '08 MS, '10 GME, vice chair for Quality and the John Benjamin Murphy Professor of Surgery, and **Joseph Leventhal, MD, PhD**, the Fowler McCormick Professor in Surgery in the Division of Organ Transplantation, were inducted into the American Surgical Association.

Jacob Iasha Sznajder, MD, the Ernest S. Bazley Professor of Asthma and Related Disorders and professor of Medicine in the Division of Pulmonary and Critical Care and of Cell and Developmental Biology, was the recipient of the 2019 Edward Livingston Trudeau Medal from the American Thoracic Society.

A RISKY, LIFE-SAVING BRAIN
SURGERY CALLS FOR A NOVEL PLAN

BRAIN, HEART, & *Courage*

WRITTEN BY CHERYL SOOHOO
PHOTOGRAPHY BY LINDSEY DECICCO AND KIM BECKER

On February 4, at 3:02 p.m., cerebrovascular neurosurgeon Babak Jahromi, MD, PhD, sent an e-mail with an unusual request to cardiac electrophysiologist Bradley Knight, MD.

He needed a “heart stopper.”

Five minutes later, Knight, who had never met Jahromi, responded in the affirmative.

A week later, the two were in the operating room, leading a 12-member team performing a rare, life-saving transvenous embolization on ShaTerra Cummins, 28, of South Bend, Indiana, who, several months prior, had gone to bed with what she thought was a terrible migraine.

In fact, she had suffered a ruptured arterio-venous malformation (AVM) deep within her brain.

Performing an uncommon embolization technique, Jahromi and Knight forced Cummins’s heart to stop pumping 12 times to reduce blood flow to her brain and help seal her AVM via the use of a special glue-like material. This transvenous catheter-based strategy was a first for Northwestern Medicine, which now joins only a handful of U.S. medical centers to innovate this bold surgical maneuver.

“We were determined to push the limits to offer ShaTerra the best therapeutic option,” says Jahromi, who is vice chair of Regional Neurosurgery in the Department of Neurological Surgery and a professor of Neurological Surgery. “The traditional embolization approach is to go through the artery to the AVM. We came from the complete opposite direction — the vein to the AVM. Instead of going downstream, we were going upstream. The procedure required immense expertise and, more importantly, a willingness to use our collective skills here at Northwestern to try something we’ve never done before and make it happen.”

A MAJOR HEADACHE

Last September, Cummins had spent her day outside with her two young children. All day, her neck had been killing her. She desperately wanted to crack it for some relief, but feared prompting what she thought were migraines that started when she was pregnant with her now three-year-old daughter.

So she waited for her husband, Christopher, to come home from work. While cooking dinner, she heard the front door open. “I thought, great, now I can pop my neck,” recalls Cummins. She did and immediately was hit with a severe pounding headache. Taking an over-the-counter pain reliever, Cummins then decided to take

a shower. That was the last thing she remembered before she blacked out.

Her husband found her in their bedroom, where she was vomiting uncontrollably. Thinking his wife needed to sleep off her headache like she had in the past, he put her to bed. The next morning, Cummins could barely speak and needed help walking. After rushing her to the emergency department of a nearby hospital, the Cummins family learned that she had suffered a ruptured AVM. She was quickly transported to a more comprehensive medical center in South Bend, where the clinical team worked to stabilize her by placing a temporary catheter in her brain to drain fluid. After two weeks in the ICU, she returned home — better, but suffering from poor balance, double vision and extreme fatigue. While her AVM had stopped bleeding on its own, the probability of future ruptures was high.

“My options were open brain surgery to take out the AVM, radiotherapy to gradually destroy it with radiation, or to leave the AVM alone — which wasn’t recommended,” says Cummins. “Because my AVM was not in a good place in the middle of my brain and close to the spinal cord, there was a risk of significant side effects with a craniotomy, but my neurosurgeon believed it was the best option. He advised me to get a second opinion and, no matter what, to find the best person for the job.” ▶

Home after her surgery, Cummins is back to doing the things she loves: playing music, singing in her church choir, and enjoying time with her kids.



PHOTOGRAPH BY Lindsey DeCicco

Her mother-in-law, a nurse, quickly used her healthcare connections to look for that “best person.” By the end of December, Cummins had an appointment with Northwestern Medicine’s Jahromi, an expert in cerebrovascular diseases with extensive experience in less-invasive endovascular techniques, as well as cerebrovascular surgery.

BRAIN PLUMBING

Plumbing terms come in handy when describing the cardiovascular system, with blood vessels serving as pipes. The largest vessels, arteries take oxygen-rich blood away from the heart to travel throughout the body. Veins do the reverse: they transport deoxygenated blood back to the lungs and heart to be refreshed and recirculated. The smallest blood vessels in the body form capillary beds that allow for the gentle exchange between blood and tissues by controlling blood flow, cell by cell. Usually, the continuous flow of blood through the cardiovascular system works just fine — until it doesn’t, such as in the case of an AVM. Although uncommon (occurring in one per 100,000 adults a year) arteriovenous malformations can be debilitating, if not deadly when they burst.

“Imagine a bowl of angry snakes, with a bunch of pipes going in and out. There is nothing normal about these connections,” says Jahromi, a self-described “brain plumber” who specializes in blood vessels of the cerebrovascular system. “Delicate veins are not designed to handle the high-speed link up to arteries. At some point, that connection is going to burst and then we have bleeding in the brain.”

Cummins had a posterior circulation AVM in what is called the eloquent cortex — a part of the brain that controls vital functions such as speech, movement and sensation. Removing her AVM through open brain surgery was possible, but presented a substantial surgical challenge: She faced the risk of “collateral damage” and serious side effects ranging from paralysis to cranial nerve injury. Standard endovascular therapy that involves threading a catheter through the groin vessel up to a brain artery to reach the AVM had been ruled out. The snaking architecture of her brain lesion



Top: Bradley Knight, MD, and Babak Jahromi, MD, PhD, with images of Cummins’s brain in the background. Photo by Kim Becker. Bottom: Cummins with her husband Christopher and their children. Photo by Lindsey DeCicco.

and the fact that the arteries supplying blood to her AVM also supplied normal brain areas made the usual arterial route a no-go.

Looking for other options, Jahromi found one in a single draining vein (versus many) that offered a straight shot to shoot liquid adhesive into the AVM to permanently shut down its blood flow. This anatomical feature of Cummins’s AVM opened the door to a novel transvenous embolization approach. However, Jahromi and his neuroradiology partner, Michael Hurley, MBBChBAO, associate professor of Radiology and Neurological Surgery, would have to inject the glue by atypically going against the current of blood flowing back to the

heart. Temporarily stopping the heart from pumping blood to the brain, and consequently preventing it from draining through the venous system, would be essential to the success of this procedure.

For this, they needed a heart stopper.

That’s when Jahromi reached out to a cardiology colleague and asked, “Who do you know who could help me with this extremely complex case?” recalls Jahromi. “He said, ‘Try Brad Knight.’”

HEART STOPPER

A cardiac electrophysiologist, the Chester C. and Deborah M. Cooley Distinguished

“We were determined to push the limits to offer ShaTerrah the best therapeutic option.”

BABAK JAHROMI, MD, PHD

Professor of Cardiology, and a professor of Medicine, Knight sees patients with heart rhythm disorders. In his toolbox is a technique known as cardiac pacing. The minimally-invasive technique involves inserting a catheter through a vein in the leg to the heart to electrically stimulate and artificially manipulate the rate of heart muscle contractions. Somewhat counterintuitively, pacing a heart to a rapid 180 beats reduces blood flow. “The heart can’t beat that fast and effectively eject blood. It just vibrates,” explains Knight. “Yet you can’t pace for too long. The body still needs blood to survive.”

Pacing to stop blood flow usually occurs for no longer than 30 seconds and only one or two times. It is typically employed in cardiac catheterization laboratory procedures involving artificial valve replacement. In Cummins’s case, Knight stopped her heart a record 12 times, for 45 seconds each time, to allow Jahromi a small window of opportunity each time to inject the glue through the vein going against a current that had now been markedly slowed.

“This was a rare scenario and perfect example of multiple specialties coming up with a creative solution,” says Knight. “We applied a technique used for one procedure to a different procedure to make it work.”

THE COUNTDOWN

“Four, three, two, one — start pacing.” This critical countdown was the only sound in the room heard at regular intervals during Cummins’s 12-hour procedure. The team kept chit-chat to a minimum. The music that normally plays in the interventional neuroradiology suite had been muted. With their own hearts beating fast, the team brought their A-game. When imaging showed the successful embolization of the AVM, everyone in the room gave each other politely exuberant high fives.

“This procedure was challenging, but it was the least risky option we had before us,” says Jahromi. “ShaTerrah is young and has a long life ahead of her. She deserved a cure and at Northwestern Medicine, we have a depth of expertise that allowed us to confidently provide her with one.” **NM**



From left: Kevin Graham (neurointerventional radiology technologist), Michael C. Hurley, MBBChBAO, Babak Jahromi, MD, PhD, Bradley Knight, MD, Prasongchai Sattayaprasert (cardiac electrophysiology fellow), and Ljuba Stojiljkovic, MD.



Designed for Discovery

The opening of the
***Simpson Querrey
Biomedical
Research Center***

ushers in a new
era of accelerated
scientific discovery.

Floor-by-floor connections with the University's Robert H. Lurie Biomedical Research Center, as well as a skybridge to the Searle Medical Research Building, enable sensitive equipment and materials to travel long distances on campus with no exposure to Chicago's climate.

PHOTOGRAPHY BY SOARING BADGER
PRODUCTIONS AND STEVE HALL

“
*Inside this modern,
new building,
scientists are
pioneering
discoveries that
will impact
the practice of
medicine and
transform
human health.*

Eric G. Neilson, MD
vice president for Medical Affairs
and Lewis Landsberg Dean



There's a new building on campus that radiates the transformative possibilities of modern science. Walking through the 625,000 square feet of sun-drenched, open spaces that make up the Louis A. Simpson and Kimberly K. Querrey Biomedical Research Center — the largest new building solely dedicated to biomedical research at an American medical school — it is impossible not to experience a sense of awe.

This is a place for innovators. For collaborators. For world-changers.

And yet, it is also a place where the dedicated, daily work of scientific investigation is on full display. Where labs are filled with specimens and equipment, where pristine architecture quickly becomes a backdrop as investigators roll up their white-coat sleeves and zero in on humanity at the molecular level.

“Inside this modern, new building, scientists are pioneering discoveries that will impact the practice of medicine and transform human health,” says Eric G. Neilson, MD, vice president for Medical Affairs and Lewis Landsberg Dean. “Here, we will accelerate the pace of lifesaving medical science, near world-class campus partners and in a global city with unrivaled opportunities for biomedical commercialization and entrepreneurship.” ▶



The Potocsnak Family Atrium



Tom Shanley, MD

Opening Doors for Children's Research

The opening of the new building encourages deeper connections between scientists in pediatrics and the larger Northwestern research enterprise.

The Stanley Manne Children's Research Institute at the Ann & Robert H. Lurie Children's will occupy four floors of the Simpson Querrey Biomedical Research Center — allowing investigators in pediatrics to share the same research space as Northwestern

scientists across disciplines for the first time. The Stanley Manne Children's Research Institute, named for retired local business executive Stanley Manne in 2014, was previously located in Lincoln Park.

"This building not only allows us to enhance our research capabilities across numerous scientific neighborhoods, but also more effectively leverage the proximity of our clinical and health

service and policy research partners to identify greater translational opportunities to improve childhood health," says Tom Shanley, MD, chair of Pediatrics at Feinberg and Lurie Children's and president and chief research officer of the Stanley Manne Children's Research Institute.

BY THE NUMBERS

Nº 1

LARGEST NEW BIOMEDICAL ACADEMIC RESEARCH BUILDING IN U.S.

12

FLOORS IN NEW BUILDING, WITH ABILITY TO ADD UP TO 16 MORE FLOORS IN FUTURE STAGES

23

RESEARCH GROUPS PER FLOOR

200

PRINCIPAL INVESTIGATORS WITH SPACE IN THE BUILDING

2,000

NEW FULL-TIME JOBS WILL BE CREATED

625,000

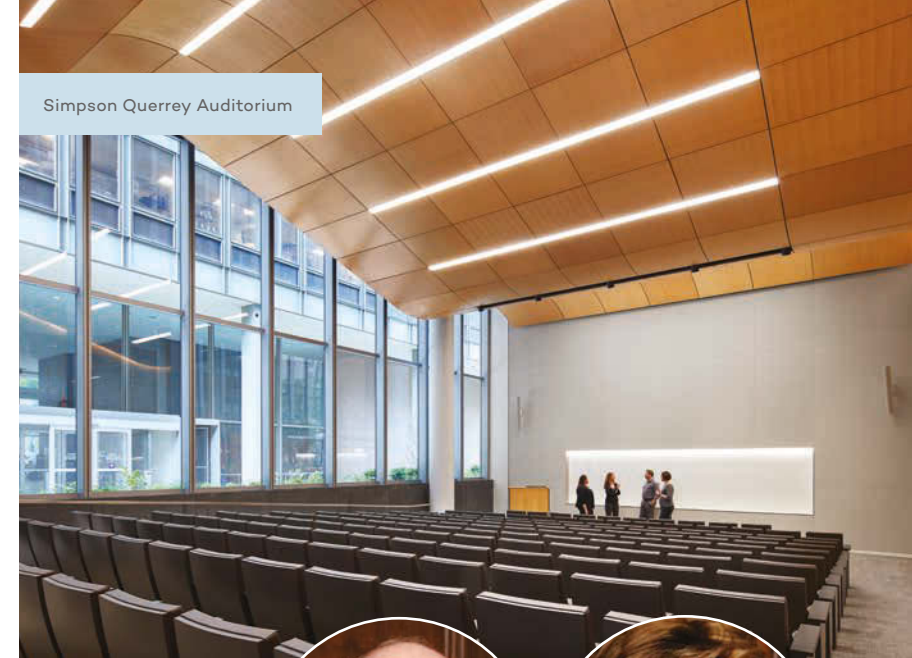
SQUARE FEET OF RESEARCH SPACE ADDED TO CAMPUS

\$1.5 B

NEW RESEARCH FUNDING ENABLED OVER NEXT 10 YEARS



Collaborative Workspaces



Simpson Querrey Auditorium

Informal gathering areas on each floor encourage collaboration.



The Namesakes

The Simpson Querrey Biomedical Research Center is named in honor of Northwestern Trustees Louis A. Simpson and Kimberly K. Querrey in recognition of their ongoing support that has advanced the University's academic excellence and scientific discovery.

Simpson and Querrey are extraordinary supporters of the University, having contributed generously to Northwestern throughout **We Will. The Campaign for Northwestern**. They also are members of NU Loyal, the giving society recognizing consistent annual giving to Northwestern, with 13 consecutive years of giving.

Space for a growing enterprise

Officially opened on June 17, the 12-story building, designed by the Chicago architecture firm Perkins+Will, has striking curved-glass exteriors and light-filled laboratory neighborhoods. Each floor can house 23 principal investigators, along with their teams — much-needed space for the fastest-growing research enterprise among all U.S. medical schools.

Northwestern has climbed from 39th to 15th in National Institutes of Health funding since 2002 and brings in \$700 million in total sponsored research funding annually. The new facility will enable Northwestern to increase that by \$150 million annually or \$1.5 billion in the next 10 years. It will also create 2,000 new high-paying, full-time jobs.

The building brings physicians and scientists from the Feinberg School of Medicine, McCormick School of Engineering, and Stanley Manne Children's Research Institute together with top-ranked clinical affiliates Northwestern Memorial Hospital, Ann and Robert H. Lurie Children's

Hospital of Chicago, and Shirley Ryan AbilityLab — all in one academic medical district.

'Collaborations will explode'

Possibilities for collaboration, whether coordinated or serendipitous, abound in the new space. The lab plan on each floor was designed around the idea of flexible research neighborhoods, creating a vibrant hub for scientists. Each floor also has centralized, informal gathering areas to promote dialogue among the three lab neighborhoods.

"Collaborations will explode," says Susan Quaggin, MD, director of the Feinberg Cardiovascular and Renal Research Institute. "Scientists will start talking about things that will lead to new directions and experiments, and bridge clinical and basic science."

Quaggin, also chief of Nephrology and Hypertension in the Department of Medicine, is excited about new proximity to potential

collaborators, such as Ali Shilatifard, PhD, director of the Simpson Querrey Center for Epigenetics and chair of Biochemistry and Molecular Genetics. For example, says Quaggin, Shilatifard's bioinformatics team has developed single-cell RNA sequencing technology (unique to Northwestern) that will unlock a deeper understanding of how glaucoma occurs and how to best develop new drugs.

As knowledge grows, the building, too, is ready to grow. It was designed for a future expansion that can more than double its size vertically, with up to 16 new floors in the second phase of construction.

"Research groups grow based on new discoveries and new funding," says Elizabeth McNally, MD, PhD, director of the Center for Genetic Medicine. "You want space that is open to expand and contract, to follow where the science is going. That's what the new Simpson Querrey Biomedical Research Center gives us." **NM**

Here, we will accelerate the pace of lifesaving medical science.

ERIC G. NEILSON, MD, VICE PRESIDENT FOR MEDICAL AFFAIRS AND LEWIS LANDSBERG DEAN

The Road to Discovery

The path to completion was paved with many milestones, from groundbreaking to the first move-in, with plenty of news coverage and social media along the way.



SEPTEMBER 2012
Design Competition Announced

Northwestern invites world's top architectural firms to submit proposals

DECEMBER 2013
Architect Chosen
Chicago firm Perkins+Will selected for inspired design



MARCH 2015
Naming Gift

The Louis A. Simpson and Kimberly K. Querrey Biomedical Research Center named in recognition of couple's generosity



MAY 2015
Finalized Plans Unveiled
Details of the 600,000-square-foot, 14-story design announced to the public

MAY 2015
Building Breaks Ground
Ceremonial groundbreaking launches construction



SEPTEMBER 2016
One Year of Progress
Extensive foundation system takes shape



MARCH 2017
Potocsnak Family Lobby Atrium Named
\$15 million gift from John Potocsnak supports first-floor space



JUNE 2017
Topping-Off Ceremony
Major construction milestone marked with ceremonial steel beam



OCTOBER 2018
Three Years of Progress
Interior construction underway, as building exterior nears completion



APRIL 2019
First Labs Move In
Initial phase of building occupancy begins



JUNE 2019
Official Opening
Dignitaries attend the dedication ceremony

Jeffrey Savas, PhD, focuses his research on synapses, the structures that let neurons “talk” to one another (shown here in an artist representation).

UNTANGLING

From the earliest changes in brain chemistry to novel approaches for clinical care, Northwestern scientists investigate a model spectrum of this devastating disease.

Written by Will Doss

ALZHEIMER'S

In November 1906, during the 37th Meeting of South-West German Psychiatrists in southern Germany, a physician named Alois Alzheimer described the case of a 50-year-old woman whom he had followed from her admission for paranoia and memory disturbances, until her death five years later.

Alzheimer noted “a peculiar severe disease process of the cerebral cortex,” describing distinctive plaque and neurofibrillary tangles in the brain. These characteristics defined the condition later named Alzheimer’s disease.

While the root cause of the disease was largely unknown for decades, scientists discovered the plaques were made of an abnormal protein fragment called amyloid beta, and the theory of the “amyloid cascade” eventually crystallized: Accumulation of amyloid plaques in the brain leads to tangles, which cause an inflammatory response, and eventually, brain cell destruction.

Focusing on this theory, scientists searched for drugs that could slow or stop amyloid beta production. While certain drugs worked well in mouse models of Alzheimer’s disease, it was a different story in humans. Again and again, clinical trials of drugs targeting amyloid beta production ended in failure — and now, the field is at an inflection point, says Jeffrey Savas, PhD, assistant professor in the Ken and Ruth Davee Department of Neurology.

“Decades of work and billions of dollars have been thrown at this amyloid cascade,” Savas says. “People are starting to rethink their assumptions and open up to new ideas.”

While many scientists still believe amyloid plaque accumulation is a major component of Alzheimer’s disease pathology, they increasingly recognize these plaques are not the foundational cause. Furthermore, finding the genesis of Alzheimer’s is compounded by its diversity: the disease comes in several forms, each affected to varying degrees by different disease mechanisms.

To that end, scientists at Northwestern’s Mesulam Center for Cognitive Neurology and Alzheimer’s Disease are investigating a spectrum model of the disease, their inquiry stretching from the earliest changes in brain

chemistry to improving diagnosis and treatment.

“A comprehensive multidisciplinary program, such as the one at the Mesulam Center, derives its strength by making heterogeneity a focus of research, not a nuisance to be avoided,” says M. Marsel Mesulam, MD, director of the Mesulam Center. “It is only by appreciating heterogeneity that we can individualize patient care and research into disease mechanisms.”

The Mesulam Center is set up precisely for this cutting-edge approach. “The same room where a patient management conference has just been held becomes the venue of a basic science laboratory meeting, often with ▶



M. Marsel Mesulam, MD
Director



Jeffrey Savas, PhD
Assistant professor in The
Ken and Ruth Davee
Department of Neurology



Peter Penzes, PhD
Ruth and Evelyn Dunbar
Professor of Psychiatry and
Behavioral Sciences



Robert Vassar, PhD
Davee Professor of
Alzheimer Research

a considerable overlap of attendees,” Mesulam says, adding, “The Neurobehavioral Clinic is our principal venue for transmitting the benefits of all developments in the field to our patients and families — and, in turn, patients who volunteer for research allow us to make new discoveries on the cognitive neuroscience of memory, language, and behavior.”

Starting at Synapses

For scientists like Savas, the biggest Alzheimer’s breakthroughs will come from investigating the origins of the disease.

“It’s like if a car breaks down: If the battery’s no good, you can’t turn on the radio,” he says. “We want to know what happens first, before it all starts to fall apart.”

Which is why Savas is currently focused on synapses, the structures that let neurons “talk” to one another.

“Synaptic dysfunction happens very early in the pathology, long before the brain cells die,” he says.

Mutated amyloid proteins play a part here, causing detrimental effects on synapse function, impairing synaptic transmission and promoting neurodegeneration. According to Savas, investigators typically believed that the post-synaptic terminal — the receiving end — was where the primary pathology was, but in a 2017 study published in *Cell Reports*, Savas found something different.

“We found the presynaptic terminal is actually the first place where it starts,” Savas says.

This lines up with another recent discovery: Last year, Savas worked with scientists across the world to uncover the normal, non-mutated function of amyloid protein. Using a biochemical interactions screen designed by Savas, the

investigators discovered that amyloid proteins normally bind to an inhibitory neurotransmitter receptor — again, in the presynaptic terminal.

These findings, published in *Science*, suggest that the presynaptic terminal may be where Alzheimer’s starts — or at least a promising therapeutic target, Savas says.

“We think the presynaptic terminal represents an underappreciated location for amyloid protein toxicity,” Savas says. “It tells us a small but important piece of the puzzle.”

Other scientists are also examining synaptic regulation’s role in Alzheimer’s disease, including Peter Penzes, PhD, the Ruth and Evelyn Dunbar Professor of Psychiatry and Behavioral Sciences. In a study published in *Molecular Psychiatry*, Penzes found that Alzheimer’s-associated mutations in a gene called BIN1 can disrupt synapse-synapse communication. While it might not be enough to cause Alzheimer’s disease on its own, Penzes believes BIN1 could be a contributor.

“If a patient has one mechanism of disease, like this gradual weakening of synapses, they might be more sensitive to other mechanisms, like amyloid protein buildup,” says Penzes, also director of the Center for Autism and Neurodevelopment and a professor of Physiology and of Psychiatry and Behavioral Sciences.

Still Fighting the Good Fight

Despite a new emphasis on understanding the root cause of disruptions in synapse-to-synapse communication, investigators aren’t giving up on fighting amyloid proteins.

Recently, Robert Vassar, PhD, the Davee Professor of Alzheimer Research and professor in The Ken and Ruth Davee Department of Neurology, was involved in a study that discovered a treatment originally developed to help

patients recover from stroke may also have beneficial effects for Alzheimer’s disease. The drug, 3K3A-activated protein C (3-APC), significantly slowed production of harmful proteins in mouse models of Alzheimer’s by inhibiting a gene called BACE1, according to the study published in the *Journal of Experimental Medicine*.

Science feeding directly into clinical care is a core pillar of the Mesulam Center’s patient care mission, and will continue to fuel future growth.

This had downstream effects: Mice modeling Alzheimer’s treated with 3-APC performed better on cognitive testing when compared to mice who received the placebo treatment. In fact, they tested nearly as well as healthy mice, demonstrating that reducing amyloid buildup could be effective in ameliorating cognitive symptoms.

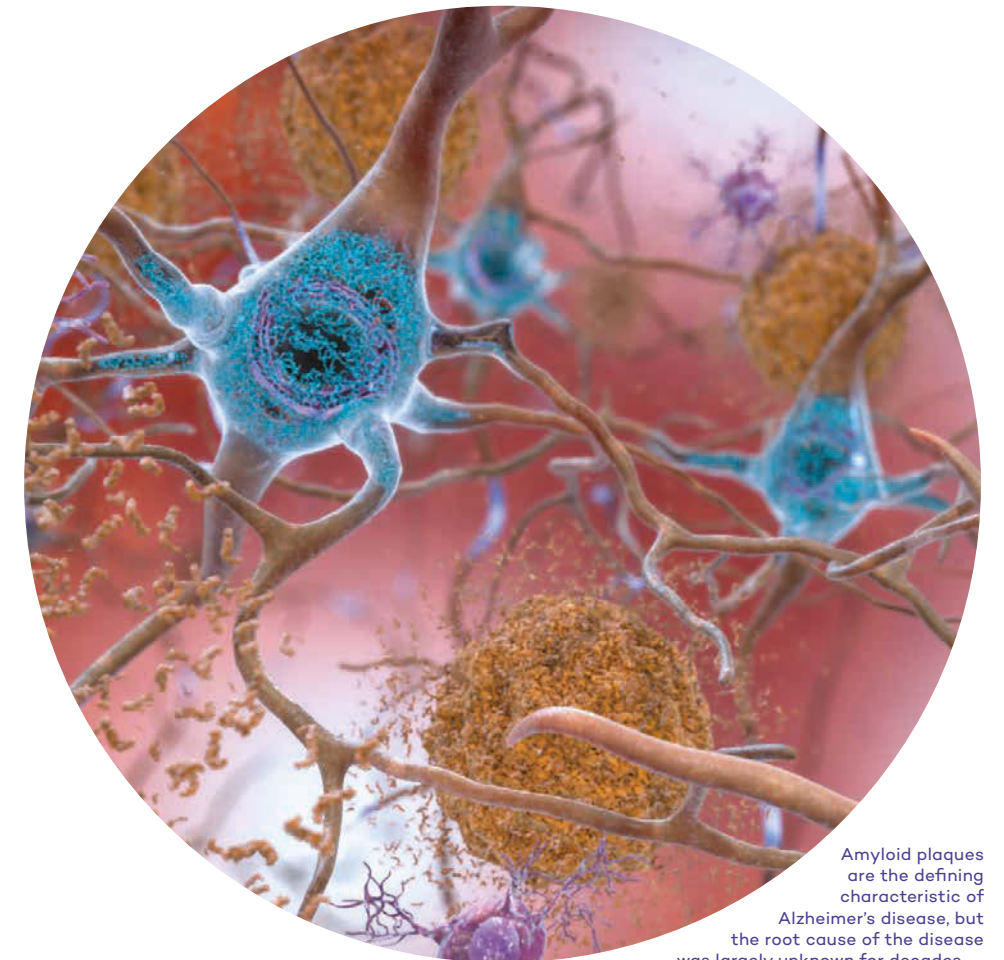
“Repurposing the stroke drug 3K3A-APC for Alzheimer’s disease is an exciting possibility, given the paucity of treatments for this devastating neurodegenerative disease,” says Vassar, who is also scientific director of the Division of Behavioral Neurology, a professor of Cell and Developmental Biology and director of the Alzheimer’s Disease Core Center grant.

However, inhibiting BACE1 has its downsides: In a different study, published in *Science Translational Medicine*, Vassar discovered that another promising BACE1-inhibiting drug had the potential to cause new defects in the hippocampus.

The investigators discovered adult mice exposed to BACE1 inhibition had deformations in the mossy fiber pathway, a structure in the hippocampus important for memory. With several clinical trials of BACE1 inhibitors either in progress or on the horizon, this is concerning, according to Vassar.

“You don’t want to create a new disease when you are trying to cure another one,” he says.

But there’s still hope. Vassar believes there might be a sweet spot of inhibition: Low enough to keep the mossy fiber pathway intact, while still high enough to significantly decrease amyloid protein production.



Amyloid plaques are the defining characteristic of Alzheimer’s disease, but the root cause of the disease was largely unknown for decades — it’s these root causes that Northwestern scientists are now uncovering.

“I want to try and find out at what level of inhibition this occurs,” Vassar says. “I think if you can fine-tune it and start early enough, you can have a huge impact.”

Clinical Care and Beyond

All this science leads to one place: the clinic, and Feinberg clinicians are improving care there, too. One recent study found a new, noninvasive way to diagnose early cognitive impairment, the earliest stage of Alzheimer’s disease where affected individuals become forgetful, but still can maintain independence.

Amani Fawzi, MD, the Cyrus Tang and Lee Jampol Professor of Ophthalmology, led the study, published in *PLOS One*, which found patients with mild cognitive impairment had fewer blood capillaries in the back of the eye, detected using a simple infrared camera.

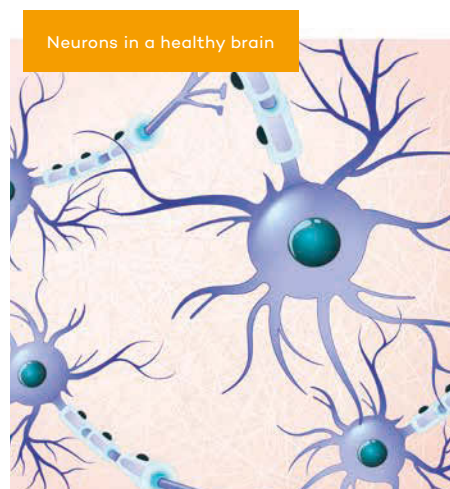
“Once our results are validated, this approach could potentially provide an additional type of biomarker to identify individuals at high risk of progressing to Alzheimer’s,” says Fawzi. “These individuals can then be followed more closely and could be prime candidates for

new therapies aimed at slowing down the progression of the disease or preventing the onset of the dementia associated with Alzheimer’s.”

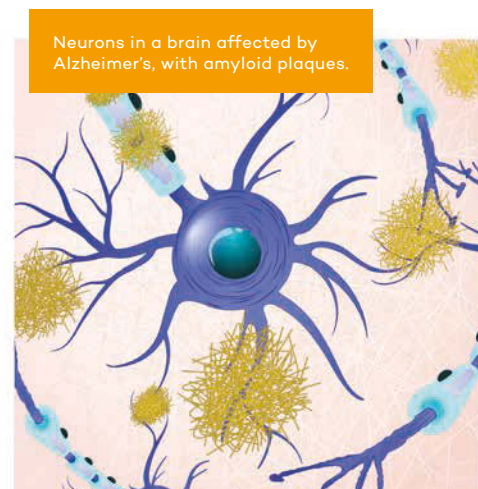
Science feeding directly into clinical care is a core pillar of the Mesulam Center’s patient care mission, and will continue to fuel future growth, according to Mesulam.

“We will learn more about the neurocognitive networks that enable us to find the right word and recall recent experiences; we will learn more about the mechanisms of selective vulnerability in neurodegenerations; and we will learn more about the reasons why a specific disease causes a specific set of impairments in individual patients,” Mesulam says. “Through these interactive developments, the clinical arm of the Mesulam Center will be able to practice its own brand of personalized precision medicine.”

Above all, the Mesulam Center is well positioned to embark on this new phase of Alzheimer’s research: pulling from all areas of science and medicine to create a new, integrative model of Alzheimer’s disease, in order to stop it in its tracks. **NM**



Neurons in a healthy brain



Neurons in a brain affected by Alzheimer’s, with amyloid plaques.

WRITTEN BY EMILY AYSHFORD
PHOTOGRAPHY BY TERESA CRAWFORD

N O S M A L L P L A N S

Susan Quaggin knew from the age of 15 that she wanted to be a physician — that's when she met her future father-in-law and role model, a family physician everyone called "Doc." But it wasn't until her first rotation as an intern at the University of Toronto that she found her calling.

An 18-year-old had arrived in the emergency room with massive swelling throughout his entire body and a test confirmed his kidneys were spilling large amounts of protein into his urine. He was sent to nephrology, where Quaggin and her colleagues found he had an aggressive disease in which a circulating factor in his blood stream was attacking the filters (glomeruli) in his kidneys.

"He had been perfectly healthy until a couple weeks prior, and we did not know — and still do not know — what the factor was that caused this disease," she says. "It showed me there was a clear need to identify new causes of kidney diseases and develop new treatments."

After Quaggin finished medical school at the University of Toronto, she completed a residency in internal medicine and a fellowship in nephrology before heading to Yale for a post-doctoral fellowship. She then returned to Toronto, where she completed a second post-doctoral fellowship to study mouse genetics and genome editing techniques, before taking a faculty position at the University of Toronto. She spent 13 years there as a senior scientist at the Samuel Lunenfeld Research Institute, a nephrologist at St. Michael's Hospital and the Gabor-Zellerman Professor in renal medicine. She built a successful career, earning a Research Award from the Kidney Foundation of Canada in 2009.

Having grown up in Canada, Quaggin had no intentions to leave her hometown, but in 2012, Eric G. Neilson, MD, vice president for Medical Affairs and Lewis Landsberg Dean, persuaded her to come to Northwestern. He was an old friend and mentor, and Quaggin knew it would be a good opportunity to be part of the exciting work happening at Northwestern.

**Susan
Quaggin's
leadership in
nephrology
brings kidney
research into
the future.**



"Northwestern has an incredible collaborative spirit. Here, I'm able to bring together people from the clinical side and the basic research side," says Quaggin, MD, now chief of Nephrology and Hypertension in the Department of Medicine and director of the Feinberg Cardiovascular and Renal Research Institute.

"I'm also a big hockey fan, and the Blackhawks are a great team," she adds, laughing.

FINDING THERAPEUTIC TARGETS

Since arriving in 2013, Quaggin, who is also the Charles H. Mayo, MD, Professor, has been conducting research on blood vessels to find new therapeutic targets for vascular health. Earlier this year, she and her collaborators identified a new therapeutic target that may help protect kidney function in patients with diabetes. The team demonstrated in a preclinical model that inhibiting a protein called VE-PTP preserves microvascular and kidney function in diabetic mice.

Last year, she and her collaborators discovered mutations that cause improper drainage and a buildup of ocular pressure. That pressure leads to one form of congenital glaucoma, a leading cause of blindness.

Though she has been conducting this kind of research for decades, Northwestern has brought a new angle to her work: therapeutic discovery.

"At Northwestern, we've become much more translational," she says. That means not only studying the cause of diseases like glaucoma, but also developing small molecules to treat them. She worked with the Innovation and New Ventures Office to create a Toronto-based biotech startup, Mannin Research Inc., which is currently developing an eye drop to treat glaucoma.

CREATING ORGANS IN A PETRI DISH

Even as her research makes its way from lab to clinic, Quaggin is busy leading several initiatives. As director of the Feinberg ▶



Cardiovascular and Renal Research Institute, she's responsible for bringing together physician-scientists and PhD scientists from across disciplines to study vascular diseases of the heart, kidneys, and eyes.

Under her leadership, the institute (now located in the new Simpson Querrey Biomedical Research Center) has doubled its investigators, and continues to grow. This summer, even more investigators will join as the institute focuses on an ambitious goal: cultivating organs in a dish. Scientists can currently create tiny organ-like structures called organoids. The next step is to transform these organoids into fully functional organs, such as kidneys or eyes. That will involve finding a way to guide the signals to create blood vessels within the organs.

"It's an exciting and ambitious goal," Quaggin says. "We have a lot of young talented trainees working to make this happen."

CREATING A HUB FOR KIDNEY RESEARCH

In 2018, Feinberg received a \$5.8 million, five-year grant from the National Institute of Diabetes and Digestive and Kidney Diseases to expand translational research into the prevention and treatment of kidney diseases.

The grant funded the Northwestern University George M. O'Brien Kidney Research

Core Center (NU-GoKIDNEY), which brings together basic and clinical scientists dedicated to identifying, testing, and translating discoveries into novel therapeutics for patients with kidney diseases.

"We want to help researchers both within Northwestern and around the world use our unique resources to accelerate and catalyze their research to cure kidney diseases," Quaggin says.

To do this, the center has created an online portal called nephroHUB, where investigators can access the center's three cores, which provide everything from kidney disease animal models and high-throughput analytical platforms to unique data and biosample repositories.

The center also conducts outreach and enrichment activities. This summer, five students from Holy Trinity High School in Chicago attended a program designed to introduce young people to kidney science and research. Center trainees also visit high schools throughout the year to share discoveries in kidney research, and investigators are working with churches on Chicago's South Side to host public events to build awareness about kidney disease prevention and treatment.

"This center really allows us to do what our passion is, which is not only to do the research, but also to provide advocacy and education," Quaggin says.



AN OPTIMISTIC COLLABORATOR

Though helming multiple initiatives can pull Quaggin in many directions, her determination to stay the course is steadfast, inspired by her father-in-law, who, at 86, was still making house calls on his bicycle. A few weeks a year, she makes time to join fellows on ward rounds, and she has inspired her daughter, Jessica Quaggin-Smith, to pursue a career in medicine (she started her internal medicine residency at Northwestern this summer).

"I've been described as optimistic, and I see myself as a collaborator," says Quaggin, who continues to be motivated by that 18-year-old she treated so many years ago. He ended up losing his kidneys and going on dialysis before receiving a transplant from his father. He lost that kidney, too.

"If we can understand this disease and prevent that from happening — *that* is the ultimate goal," she says. **NM**

ALUMNI

Alumni President's Message



Engaging with the MAAB

A letter from Rishi Reddy, '00 MD (HPME)

Hello, Feinberg alumni! We celebrated Alumni Weekend 2019 in Chicago with the class of 1969. I was proud to announce the members of that class who were present, including our alumni board's own Gary Rusk, '69 MD, who chairs the Philanthropy Committee. My goal over the next two years as your Medical Alumni Association Board (MAAB) president is to recognize alumni who have engaged with Northwestern after graduating to help current students and other alumni.



Bonucci traveled to work in a primary care clinic in eastern Bolivia in 2017, taking along his daughter, a pre-medical student at the time.

Paul Bonucci, '96 MD, joined the MAAB over eight years ago and has lived through the transition of the board as it has become a more active alumni board, increasing its engagement with current students, administration, and other alumni. Dr. Bonucci is the Medical Director of the Emergency Department at Illinois Valley Community Hospital in Peru,

Illinois. Shortly after he joined the MAAB, the "standing" committee format was created, allowing members to participate in more focused work during board meetings and, more importantly, in between meetings.

The committees currently include Engagement, Mentoring, Philanthropy and Strategic Initiatives (a broad category designed to encompass novel programs to engage alumni and students). Dr. Bonucci, along with Jeffery Lawrence, '79 MD, co-chaired the new Global Health program within the Strategic Initiatives group, which now includes the Women in Medicine, MDs in Business, and Primary Care programs.



Dr. Bonucci's work on the global health sub-committee combined his international medicine experience with Northwestern's educational leadership in Global Health, which enables almost 50 percent of medical students to complete an overseas rotation through over 30 programs.

Mark Molitch, the Martha Leland Sherwin Professor of Medicine in the Division of

Endocrinology, Metabolism and Molecular Medicine, has helped run a primary care clinic in eastern Bolivia for over 15 years. Dr. Bonucci traveled to work in that clinic in 2017, taking along his daughter, a pre-medical student at the time. They worked with medical students whom Dr. Bonucci mentored, who in turn helped mentor Dr. Bonucci's daughter. This trip has resulted in lasting memories for the Bonucci family. Dr. Bonucci took over leadership of the Strategic Initiatives Committee along with Jeff Sherman, '84 MD, which has allowed him to continue to contribute, by overseeing other alumni coordinating the individual initiatives.

After eight years, Dr. Bonucci has decided to step down from the MAAB, moving to a "sustaining" member status. My goal as president is to figure out how to keep the Paul Bonuccis of the Alumni Association engaged, active and continuing to contribute to the Northwestern family. Opportunities such as the Mentorship Network and the HOST program are critical mechanisms by which *all* alumni can help our students and their fellow alums.

Now that Dr. Bonucci has stepped down, I asked him what he could share with other alumni about the benefits of engaging with the MAAB. "I didn't fully understand the breadth and complexity of Northwestern before joining the board," he said. "I have a higher level of respect for the scholarship and advances in medical science that occur at NU. It is a top-tier institution with incredible faculty and students."

Inspired to get involved? Email director of Alumni Relations Babette Henderson at babette.henderson@northwestern.edu. Thank you for staying engaged and GO CATS!

Classmates Reconnect at Alumni Weekend 2019



“This is a place that is constantly changing and evolving in many different ways.”
ERIC G. NEILSON, MD

During medical school at Northwestern in the 1960s, Charles Putnam, '69 MD, PhD, completed a rotation in pediatrics at Children's Memorial Hospital, finding it to be one of his most impactful clinical experiences.

So when Putnam returned to Northwestern's campus this year to celebrate his 50-year class reunion during Alumni Weekend, he looked forward to touring the new Ann & Robert H. Lurie Children's Hospital of Chicago, built in 2012.

“I rotated on the leukemia ward at the old children's hospital, and that's when I think I really developed this visceral hatred of cancer. This was still pre-combination drug chemotherapy — and it was sobering,” said Putnam, who spent time as a transplant surgeon before earning a PhD in molecular biology in 2004. He now conducts research in cancer biology and targeted immunotherapy as a professor at the University of Arizona.

Putnam was one of more than 600 alumni and guests who gathered during Alumni Weekend on April 26 and 27 to reminisce, reconnect with classmates, and learn about the latest developments at the medical school.

Over the weekend, alumni attended a variety of social and educational events, including class reunion dinners, continuing medical education sessions, visits to Chicago attractions, and tours of buildings around campus, such as the new Louis A. Simpson and Kimberly K. Querrey Biomedical Research Center.

On Friday afternoon, alumni also sat down with current Feinberg students during a mentoring lunch, which was organized around specialties. At the table for the Physician Assistant (PA) Program, recent graduate Jamie Hitro, '18 PA-C, was eager to give back to the current class of students.

“When I was a student, I benefited from the mentoring lunch during Alumni Weekends.



The MD Class of 1969 at their 50th reunion class dinner.



So, it was nice to be able to go back today and meet with some of the students and be on the other side,” Hitro said. “As a new grad, it's also great to have a chance to reconnect with classmates I haven't seen in the past year, as well as try to expand my network as I make my way into the professional field. I love that I can come back here and the faculty and staff all recognize me and want to check in and know where I am with my life.”

Following the lunch, Eric G. Neilson, MD, vice president for Medical Affairs and Lewis Landsberg Dean, hosted a “Conversations With the Dean” for alumni, guests, faculty, and staff. Dean Neilson answered questions from the audience and provided an overview of the state of the school, highlighting Feinberg's research enterprise, rise in national rankings, and plans for the future.

“This is a place that is constantly changing and evolving in many different ways,” Neilson said. “We are very proud of the tremendous faculty and students that we have brought here, and we have really wonderful, innovative health-care to offer Chicago.”

Throughout the weekend, alumni also attended educational forums led by Feinberg faculty, with topics ranging from precision medicine and artificial intelligence to genomic therapies for blood disorders. Many alumnae gathered for the annual Women in Medicine Tea at the Drake Hotel. On Friday evening, attendees gathered for an all-alumni reception, including drinks, dinner, dancing, and a salute to the milestone reunion classes, from the class of 1954 to the class of 2014.

The 2019 Distinguished Alumni Award was also presented to Richard Gillum, '70 MD, a pioneer in the field of cardiovascular health disparities and a co-founder of the Association of Black Cardiologists. A video conversation between Gillum and Clyde Yancy, MD, MSc, chief of Cardiology, the Magerstadt Professor and vice dean for Diversity and Inclusion, was screened at the reception.

“I hope that Northwestern will continue its proud history of offering opportunities for minorities and that they will continue a strong commitment to the Chicago community,” Gillum said.

Opposite page, bottom: Three medical students join Sara Reinganum, '89 MD, and Coco Cabrel, '87, '89 MD (far right), at a networking reception. Right, top to bottom: Charles Putnam, '69 MD, PhD, advises a medical student; Shelly Vaziri-Flais, '95, '99 MD, '02 GME, Sudip Bose, '95, '99 MD, and Nicole Dupraw Carter, '99 MD, at the Fun Run; watching video of Richard Gillum, '70 MD, at the Distinguished Alumni Award presentation, and Worldster S. M. Lee, '69 MD, with Patricia Lee, '73 PhD, at the Simulation Center tour.

LYDIA PLEOTIS HOWELL, MD, '81

CHANGE AGENT

Guiding her field through revolutions in technology and women's health

Lydia Pleotis Howell, MD, '81, has been shepherding the field of cytopathology through shifting technologies and workforce trends for more than two decades.

Back in 1995, Howell served as the principal investigator of an FDA validation trial of an Automated Cytologic Preparation Process and Interactive Screening System (AutoCyte). The system used early versions of artificial intelligence (AI) and neural networks to assist clinicians by identifying the most abnormal cells from a Pap test. The test won FDA approval, but the computer-assisted screening component never went into use, in part because pathologists and cytotechnologists weren't yet ready to embrace the technology.

"It was an idea ahead of its time," says Howell, now chair of the Department of Pathology and Laboratory Medicine at the University of California, Davis School of Medicine. But since then, AI and related computer-assisted technologies have increasingly been embraced

in cytopathology and medicine. "I love the fact that my subspecialty was at the forefront," she says. "My experiences as a cytopathologist have driven my interest as a department chair. I have made diagnostic innovation, including development of new technologies for microscopy and interpretation, a research theme in my department."

Howell's subspecialty has also been at the core of her leadership trajectory. She served as president of American Society of Cytology in 2011 and is now a president-elect of the Association of Pathology Chairs. One of her goals is to help the field grow and adapt to a changing landscape created by increasing use of technology, the need for cost efficiencies and enhanced accuracy, and a looming shortage of pathologists.

"We all need to reinvent ourselves and change what we do based on patient needs and the new technologies at our disposal," she says.

Multiple Passions

Pathology appealed to Howell when she was a medical student at Northwestern because of the breadth of the field. As she tells medical students each year: "As the medical director of the clinical laboratories, every patient in this hospital is my patient — the laboratory touches them all. And pathologists don't have to focus on one organ system — we do all of them."

Yet, even while "doing all of them," Howell has always maintained a particular commitment to women's health. Improving screening for breast cancer and cervical cancer has been the focus of her research and advocacy. In 2017, she received the American Society of Cytopathology's highest honor, the Papanicolaou Award (named after George Nicholas Papanicolaou, who developed the Pap test), for her work to improve screening for women. This included helping to develop liquid-based, thin-layer Pap testing technologies, which have become standards in the field. She has also served on state and national advisory boards to help create and implement best practices.

"These are common but serious diseases that affect women in the prime of their lives," she said. "You can screen for them, you can help prevent them, and minimize the impact of the disease."

Howell credits role models such as Denise DeFrias, MD, '76 GME, who created and led the Division of Cytopathology at Northwestern while Howell was in medical school, with inspiring her pathway into pathology and, eventually, leadership positions.

Today, Howell loves the public health aspects and the business side of running a clinical laboratory at a major academic and quaternary medical center serving a 33-county region.

"As a medical student, I never dreamed of the kind of leadership roles that I have today," she says.

Supporting Women in Medicine

As an undergraduate and medical student, Howell took advantage of Northwestern's Honors Program in Medical Education, which allowed her to complete her undergraduate degree in two years and gave her guaranteed admission to the medical school where she met her husband, orthopedic surgeon and classmate Stephen Howell, '81 MD. Shaving two years off the process enabled her to have her first child, a daughter, Stephanie, as she finished her training. After she joined the faculty at the UC Davis, she had her second daughter, Stacey, who is now a cardiology fellow.

"I really appreciated being able to have this alternative and advantageous pathway for my career," she said. "We need more of that today — more opportunities for different pathways into one's career, and accelerated pathways are really important."

Between 2002 and 2007, during her tenure as Associate Dean of Academic Affairs at UC Davis, she established flexible and family-friendly policies and worked to eliminate inequities in career tracks. She also co-founded the university's Women in Medicine and Health Science program, which provides mentoring, support, and leadership training for female faculty in medicine and nursing.

In 2009, she received a \$1.27 million grant from the National Institutes of Health to study career flexibility in academic medicine. The study showed that policies promoting career flexibility are universally supported by both men and women, yet there remain barriers and career penalties to taking advantage of them.

She encourages other women in biomedicine to work together to improve their fields and notes that women have growing clout as they now outnumber men in medical schools.

"We all need to work together to make our careers more hospitable and welcoming," she said. "Women need to be committed to participate, to create change, to become leaders, and not step out. There is power in numbers."

CAREER MILESTONES

1981

Graduated from Northwestern Medical School.
Began residency in anatomic and clinical pathology at Temple University Hospital, Philadelphia.

1986

Completed fellowship in cytopathology, Lankenau Hospital (affiliate, Jefferson Medical College), Philadelphia.
Began 32+ year faculty appointment at University of California, Davis School of Medicine.

1995

Site PI for beta-test and FDA validation trial for AutoCyte.

2002

Began five-year appointment as Associate Dean of Academic Affairs following completion of Drexel University's Executive Leadership Program in Academic Medicine, a national leadership development program for women.

Co-founded Women in Medicine and Health Science (WIMHS) program and served as co-leader for 15 years.

2009

Began funded studies as co-PI of women's careers in biomedical science; supported through a \$1.27M NIH R01 grant, Women's Careers in Biomedical Sciences and Family Friendly Policies and Innovation Award for Faculty Career Flexibility in Medical Schools, Alfred P. Sloan Foundation.

2010

Began 10+ year appointment as chair, Department of Pathology and Laboratory Medicine.

2011

President, American Society of Cytopathology, following nine years on the society's executive board.

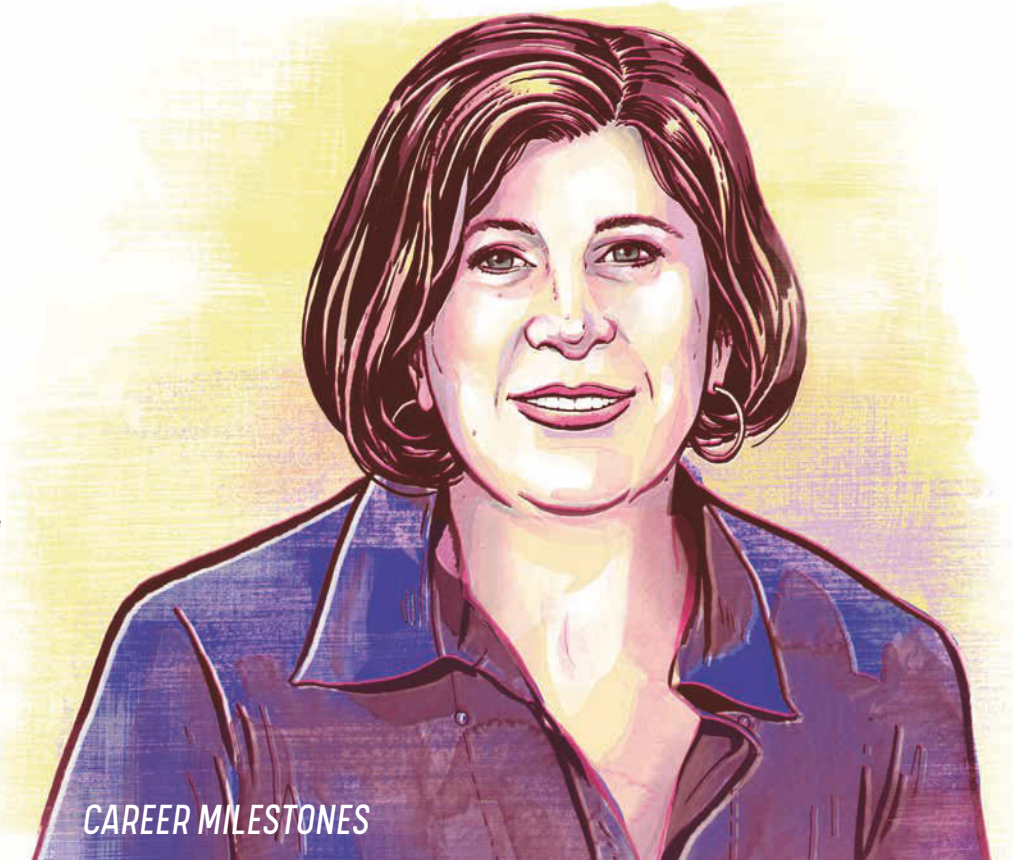
2017

Began two-year term as chair, Council of Chairs, UC Davis Health.

Received Papanicolaou Award (highest honor of the American Society of Cytopathology) and Dean's Award for Inclusion Excellence (team award for research group examining women's careers in biomedical science).

2018

Began two-year term as president-elect, Association of Pathology Chairs.



PROGRESS NOTES

We'd love to hear from you!
Please share your recent
news, accomplishments and
important milestones with us.

Send your updates and
high-resolution photos to
medcommunications@northwestern.edu.
We will publish them in an upcoming
issue of the magazine.



Four Southern California alumni from the MD Class of 1973 get together regularly for dinner. From left to right, *Steve Golbus, '73 MD*; *Dan Gardner, '73 MD*; *Stanley Goldberg, '73 MD*; and *Leo Gordon '73 MD*. 📷 1

1960s

Theodore C. Ning, Jr., '68 MD, was honored by the University of Colorado Medicine Alumni Association at the 2019 Silver and Gold Alumni Banquet. Ning received the Humanitarian Award in recognition for lifelong service to society, extraordinary service to community, and leadership through global and local service.

1970s

Richard F. Gillum, '70 MD, adjunct professor of Medicine at Howard University College of Medicine, was awarded the Northwestern University Feinberg School of Medicine Distinguished Medical Alumni Award at Alumni Weekend in recognition of his career as a pioneer in the field of medicine. Created in 1998 by then-vice president and dean of the medical school, Harvey Colten, this award is presented annually to recognize alumni whose outstanding professional achievements bring honor to the medical school and merit special recognition.

Guy T. Williams, '70 MD, and his wife, Ann Hornback, moved to Baltimore in January 2019 to be closer to their son, Cameron, after living in New Orleans since 1971. Their son is completing his fourth year of residency in Psychiatry at University of Maryland, Baltimore. Williams retired in December 2017 after practicing internal medicine and nephrology in New Orleans. He practiced at the Louisiana State Penitentiary at Angola from 2008 to 2011. Since 2011, he has practiced addiction medicine in New Orleans and Lafayette, Louisiana. His wife has been a well-known artist in New Orleans since the 1970s. Unfortunately, she has been disabled by interstitial lung disease since January 2018, but her condition has stabilized and she has become more independent.

Claire Panosian, '76 MD, '80 GME, who has pursued a career in tropical medicine, shared that she recently learned that *John Longano, '78 MD, '82 GME*, was the ER attending who cracked the famous outbreak of rat lungworm infection, also known as

eosinophilic meningitis (formerly known as *Angiostrongylus cantonensis*) which was reported in the *New England Journal of Medicine*. She writes, “Unfortunately, the parasite continues to spread and is now well established in Hawaii, among other tropical locales. It has also entered the U.S. mainland, specifically in Florida and other Southeastern states.”

Panosian and Logano are gathering stories for a documentary about this foodborne parasite. To contribute, please email jllogano@aol.com or CPanosian@mednet.ucla.edu.

1980s

Todd Bragin, '81 MD, currently resides in West Hartford, Connecticut. He writes light-heartedly, “My two older sons got married six weeks apart, now living in Upper West Side of Manhattan. How come I am still paying their cell phone bills?” His youngest son graduated with his major in economics and minor in computer science.

Todd Rosengart, '83 MD, who is the DeBakey Bard Chair of the Michael E. DeBakey Department of Surgery at Baylor College of Medicine, was recently elected to a four-year term as a member of the Board of Directors of the American Association for Thoracic Surgery. He is also currently serving as president of the Society of Surgical Chairs, a member organization of the American College of Surgeons. He and his wife Debbie live in Houston, Texas. Their two sons live in New York and Washington, D.C.

Gabriel M. Kind, '86 MD, '94 GME, was appointed to be a director of the American Board of Plastic Surgery at the board meeting in May 2019. Kind will serve a six-year term.

Anthony K. Chen, '87 MD, who practiced anesthesiology for 27 years, has retired from the Torrance Anesthesia Medical Group in September 2018.

“In August 2018, I had traveled to Tanzania to donate anesthesia equipment to the Kilimanjaro Christian Medical Center and also to hike Kilimanjaro for a second time,” writes Chen. “At the summit, perhaps due to the hypoxemia I was experiencing, I became convinced that I should retire from medicine. Now, I am happy with retirement and busy with more hiking and writing for AMDinvestorblog.com.” 📷 2

Julie Holland, '89 MD, was named vice president of Pediatric Primary Care for Advocate NorthShore Pediatric Partners, beginning her role on June 1. In her role as a vice president, Holland will serve as the physician liaison to primary care service line directors. She will be responsible for meeting primary care performance goals related to quality, loyalty, and operational and financial success. She will also assist in setting standards and developing innovative office practices in the primary care setting. 📷 3

Vallerie (Valentini) McLaughlin, '89 MD, '95 GME, the Kim A. Eagle, MD, Endowed Professor of Cardiovascular Medicine at the University of Michigan, was appointed the associate chief clinical officer for Cardiovascular Services of the University of Michigan Medical Group. She continues to serve as the associate chief of Cardiovascular Medicine and director of the Pulmonary Hypertension Program at the University of Michigan. 📷 4

1990s

Reed A. Omary, '91 MD, '98 GME, recently received the Geoffrey David Chazen Award for Innovation in Medical Education at the Vanderbilt Academy for Excellence in Education banquet. The award recognizes an individual who has made special contributions to the educational programs of Vanderbilt Medical School through the development and implementation of effective innovation in educational approach. Omary is chair



and professor of Radiology at Vanderbilt University Medical Center and director of the Medical Innovators Development Program. 📷 5

Sudip Bose, '99 MD, is a featured physician on the TLC reality television show, “Untold Stories of the ER.” Visit docbose.com to learn more. 📷 6

2000s

Alicia Kieninger, '01 MD, and Mark Mantay, '00 JD, an alum of the Northwestern Pritzker School of Law, were married December 8, 2018 at the Waldorf Astoria Chicago. In attendance, were groomsman Jeremy Downs, '00 JD, and *Joel Funk, '01 MD*. Mark and Alicia met through mutual friends just two years ago, despite both having lived in Lakeshore Center in 1997. They reside in Lake Orion, Michigan, with their three boys. 📷 7

Shirley Y. Chi, '01 MD, '02 GME, was recently recognized as a 2019 “Top Doctor” by *Los Angeles Magazine*. Chi specializes in medical

and cosmetic dermatology with an emphasis on patient advocacy and education. She is frequently an expert contributor to ABC Eyewitness News for the greater Los Angeles area and also a recipient of the President of the United States Volunteer Service Award for her dedication to the field of medical education. 📷 8

Steven C. Cheng, '01 MD, '04 GME, was the recipient of the Course Director of the Year Award at the Distinguished Service Teaching Awards Ceremony at Washington University School of Medicine in St. Louis. Distinguished Service Teaching Awards are given annually in appreciation of exemplary service in medical student education. Cheng, associate professor of Medicine in Internal Medicine-Nephrology, is also a previous recipient of the Professor of the Year Award. 📷 9

Monica (Mona) Patadia, '05 MD, completed her one-year elected appointment as president of the Chicago Laryngological and Otological Society. She remains an associate professor of Rhinology at Loyola University Medical School.

Benjamin Singer, '07 MD, '11 GME, received the Young Physician-Scientist Award from the

American Society for Clinical Investigation (ASCI). He currently serves as an assistant professor of Medicine in the Division of Pulmonary and Critical Care, and Biochemistry and Molecular Genetics, at Feinberg.

2010s

Brandi Jackson, '15 MD, and her twin sister, Brittani Jackson, MD, were recently featured on “The Ellen Degeneres Show” for their dedication to providing healthcare to the underserved and uninsured in Chicago. Jackson and her sister shared information about their work in the community and were recognized by Ellen for their incredible and impactful efforts.

📷 (left) 10

GME

William Dawson, MD, '69 GME, recently retired from his second career — 22 years of teaching bassoon and other low-reed instruments privately in Chicago's north suburbs. He retired first in 1996 from a private practice of hand and orthopaedic surgery in Evanston. Currently still active as a writer, editor, and speaker on performing arts medicine topics, he is a past president of the Performing Arts Medicine Association and the author of “Fit as a Fiddle: The Musician's Guide to Playing Healthy.”

Joseph Purpura, MD, '80 GME, '09 MS, began a career in the biotech industry as medical

director of Device Safety Operations at Baxter International in Deerfield, Illinois, after completing a master's in Healthcare Quality and Patient Safety at Northwestern's Institute for Healthcare Studies. Purpura then joined Allergan in Santa Barbara, California, and has recently been promoted to associate vice president of Medical Device Safety. Purpura also serves as clinical assistant professor of Obstetrics and Gynecology at Feinberg. 📷 11

Dustin Allan Carlson, MD, '13, '16 GME, '15 MS, is the recipient of the 2019 Junior Faculty Development Grant with the American College of Gastroenterology Institute for Clinical Research and Education. The award allows for a three-year window of protected research time for a promising clinical investigator. 📷 12

In Memoriam

Northwestern Medicine expresses its condolences to the families and friends of the following alumni (listed in order of their graduation year) and faculty who have recently passed away. All are in 2019 unless specified.

Bernard S. Zager, '50 MD
Las Vegas, Nevada
APRIL 29

James F. Culver, MD, '51 GME
South Daytona, Florida
MAY 25

Calvin L. Rumbaugh, '52 MD
Provo, Utah
APRIL 15

John E. “Ed” Norris, '52 MD
Houston, Texas
MAY 29

ALUMNI

Jean J. Austin, '43 MD
Marco Island, Florida
FEBRUARY 6

Homer S. Arnold, '49 MD
Austin, Texas
APRIL 19

Maer B. Ozonoff, '54 MD
Hartford, Connecticut
MAY 11

Eugene Bont, '56 MD
Cavendish, Vermont
APRIL 13

Ruben B. Shehigian, '60 CERT
Hammond, Indiana
APRIL 21

George R. de la Fuente, '62 MD
Seattle, Washington
MAY 11

Betty M. Hahneman, '52 MD, '56 GME
Chicago, Illinois
JULY 23

Roger A. Rovelstad, '53 MD
Largo, Florida
JANUARY 15

James W. Ryan, MD, '64 GME
Glenview, Illinois
MAY 27

C. Wayne Callaway, '67 MD, '69 GME
Washington, D.C.
MAY 11

Kenneth J. Murray, '70 MD, '73 GME
Ruxton, Maryland
MAY 3

Henry E. Russell, '72 MD
Charleston, South Carolina
MAY 20

Lawrence J. Pass, '77 MD
Nashville, Tennessee
JUNE 19

FACULTY

Thomas Stafford, MD
clinical assistant professor of Ophthalmology
Evanston, Illinois
OCTOBER 13, 2018

H.O.S.T.
Help Our Students Travel

HOST connects MD alumni with fourth-year students during the residency interview season, typically between October and January. With the cost of medical education growing and student indebtedness becoming a national issue, we ask Feinberg alumni to help by participating in HOST.

Alumni hosts help offset the financial burden and stress of traveling for interviews by offering students any of the following: complimentary housing; local transportation; a tour of the area; a meeting to answer questions about residencies, your specialty, and/or the local medical community; an introduction to other medical colleagues and potential mentors.

PLEASE SUPPORT OUR STUDENTS BY JOINING TODAY:
mentor.northwestern.edu/programs/FeinbergHOST

For more information, contact Dan Schwarzlose at 312-503-4519 or daniel.schwarzlose@northwestern.edu.



“The interview trail can be very expensive with many students traveling to 15 or more cities across the country. It was invaluable having both a place to stay and a friendly face while I was visiting different cities. My host in D.C. showed me around the city and had insight into cost of living and the culture of different neighborhoods. I consider her now a life-long contact.” — BRI KNOLL, '18 MD

PT

Bill Healey, '93 PT, EdD, posted “Our Profession Should Be Community-Minded — and Community-Invested” on the American Physical Therapy Association's PTTransforms blog on June 5.

Rachel Tappan, '97 MPT, DPT, will be representing the American Physical Therapy Association on the Steering Committee for the Consortium for Spinal Cord Medicine, which is funded and administered by the Paralyzed Veterans of America. The committee oversees the updating and new development of clinical practice guidelines.

Wendy Wagner, '98 MPT, has worked in a variety of pediatric settings as a physical therapist since graduating. Wagner writes: For as long as I can remember, I have struggled with chronic pain, hypermobility, disabling headaches, and more. When a pediatric patient came through my clinic with a similar list of symptoms and a diagnosis of Ehlers Danlos Syndrome (EDS), I started to explore this condition. I learned that it is a genetic connective tissue disorder where collagen is not properly formed and affects multiple organ systems. I confirmed my diagnosis of EDS last summer and have been on a treatment routine to improve core strength, reduce pain, maximize function, and improve my quality of life. Once word spread that I was a physical therapist and had EDS, I was flooded with patients looking for help with the only known treatment for EDS: physical therapy. If you see someone who is hypermobile, experiences frequent sprains, subluxations or chronic pain, has headaches and poor scar formation, consider a screening for EDS. It is under-diagnosed and deserves more attention from the medical community in the future. I plan to be a part of that future. 📷 13



Supporting the Next Generation of Physicians

Scholarship Donors Honored at Annual Luncheon

Right: Dane Sannes (middle), a first-year medical student and speaker at the luncheon, chatted with Louis Fazen III, '69 MD, and guest Victoria Wheary.

Below: About 250 people — including nearly 90 students — attended this year's Commitment to Scholarships Luncheon.



Ramael Ohiomoba, a first-year medical student, expressed gratitude to all of the scholarship supporters.

"I thank you for giving me this freedom and the gift of education."

Northwestern, and today their descendants fund a scholarship in the family's name.

Student Scholars Share Their Stories

During the event, two first-year Feinberg students, Ramael Ohiomoba and Dane Sannes, spoke about their pathways to medical school, their experiences so far at Feinberg, and their aspirations for the future. They also emphasized how thankful they were to everyone in the room for their essential support.

"I stand before you

today with the great honor of sharing my classmates' and my own gratitude to the donors both present here today and afar. It is in no small part due to your support that many of us have been able to take advantage of the wonderful experiences provided at Feinberg," said Sannes, the Jerold A. Lein Scholar.

"Because of your generous donations, I have been able to develop lasting relationships with world-renowned mentors, engage in an abundance of research opportunities, and gain fulfillment through community service projects in one of the most vibrant cities in the world," said Ohiomoba, who holds the Medical Alumni Scholarship.

"I realize how fortunate I am to be able to focus on taking advantage of these opportunities without having to constantly worry about my personal financial limitations. I thank you for giving me this freedom and the gift of education," she added.

Medical student scholars and Feinberg leadership expressed their gratitude to generous alumni, faculty, and friends who support scholarships during the annual Commitment to Scholarships Luncheon held this spring at the Ritz-Carlton in Chicago.

"We remain eternally grateful as each year our scholarship donors continue to provide support while new donors join the scholarship family," said the luncheon's emcee, Diane B. Wayne, '91 MD, vice dean for Education, chair of Medical Education, and the Dr. John Sherman Appleman Professor of Medicine. Wayne also is a supporter of the Lynda Singshinsuk Class of 1991 Scholarship.

Providing scholarship support for exceptional students is a top priority for Eric Neilson, MD, vice president for Medical Affairs and Lewis Landsberg Dean, and of **We Will. The Campaign for Northwestern Medicine**. Through this campaign and well into the future, the medical school hopes to provide some type of tuition support

to all students who have educational debt, which would require an \$800 million endowment for scholarships. So far, the Feinberg scholarship endowment stands at an approximate value of \$191 million, thanks to thousands of generous supporters who give to this priority area of need.

Wayne shared that 12 scholarships have been established since last year's luncheon, including the Class of 1969 Scholarship, created by a generous group of Northwestern medical school alumni celebrating their 50-year reunion.

"The scholarship is a real tribute to what we can do as a class and how proud we are of Northwestern," said luncheon speaker Louis Fazen III, '69 MD, who shares his unique path in medicine in our Perspective column on page 40. "It's great to see the students here today — they are the future of medicine. We wish the students well and think this is a great opportunity to lower tuition for them." Fazen's father and grandfather also earned their medical degrees at



From left to right: Eugene Bauer, '67 MD, Kurt Lu, MD, and Gloria Bauer, '67 MD, with Eric Neilson, MD, vice president for Medical Affairs and Lewis Landsberg Dean.

LU INVESTED AS THE EUGENE AND GLORIA BAUER PROFESSOR OF DERMATOLOGY

Kurt Lu, MD, a highly regarded clinician, scientist, and educator whose research focuses on understanding and controlling inflammation in the skin, was formally invested this April as the Eugene and Gloria Bauer Professor of Dermatology. This prestigious academic position provides protected time for Dr. Lu to pursue research projects and other scholarly pursuits.

The new professorship was established in honor of Eugene A. Bauer, '67 MD, and his wife, Gloria Bauer, '67, a graduate of Northwestern's former nursing program. The two previously established the Ruth K. Freinkel, MD, Research Professorship in Dermatology in admiration for Bauer's early mentor, now held by Jaehyuk Choi, MD, PhD.

"[Department chair] Dr. Amy Paller has built what I believe to be the most balanced dermatology department in the country," said Dr. Bauer, explaining why they support the medical school in this way.

"Northwestern gave us our future, and it's nice to pass it on to someone else," Mrs. Bauer added.

NORTHWESTERN TOP RECIPIENT OF RESEARCH FUNDING FROM THE AHA

At an annual reception last spring honoring the long-time partnership between Northwestern Medicine and the American Heart Association (AHA), attendees had more to celebrate than ever: Feinberg became the top recipient in the U.S. of research funding from the AHA, receiving nearly \$17 million for active awards.

This funding includes competitive grant awards for five AHA Strategically Focused Research Network centers, each part of a national consortium focused

A NEW HOME FOR THE MESULAM CENTER FOR COGNITIVE NEUROLOGY AND ALZHEIMER'S DISEASE

In May, donors joined Northwestern Medicine leadership and experts in neuro-degenerative disease to celebrate new state-of-the-art space for the Mesulam Center for Cognitive Neurology and Alzheimer's Disease, located on the eighth floor of the Tarry Research and Education Building.

Guests toured a neuroimaging suite for advanced brain analyses, an electrically and acoustically shielded space for electrophysiological recordings, video-linked testing rooms, and an enlarged basic research laboratory. The lab, now officially

known as the Ruth D. and Ken M. Davee Research Laboratory to recognize landmark support from The Davee Foundation, includes a brain bank and special area for cognitive morphometry — measuring changes in the structure of the brain — as well as a microscopy suite with specialized equipment for visualizing cellular images.

"None of this would have come without the dedicated philanthropy of The Davee Foundation and so many other families," said M. Marsel Mesulam, MD, director of the center, which is featured on page 22.



M. Marsel Mesulam, MD, cuts a purple ribbon to ceremoniously open the new space.

on a single urgent cardiovascular health issue. Northwestern's centers focus on prevention, disparities in cardiovascular disease and stroke, atrial fibrillation, children's health, and vascular disease.

"We are No. 1. It's a privileged place to be; we've earned it; and we intend to deliver on the promises made," said Clyde W. Yancy, MD, MSc, the Magerstadt Professor of Medicine and chief of Cardiology.

WRITTEN BY *Louis Fazen III, '69 MD, MPH*

A COMMITMENT TO GLOBAL HEALTH

Reminiscing with classmates during our recent 50-year reunion reignited the ideals that took hold during my formative years as an undergraduate student on Northwestern's Evanston campus and stemmed all the way to my graduation as a doctor of medicine in 1969. Little did I realize on graduation day how much more I would still learn as I set off for my career in pediatrics and public health.

Growing up in the house where my father ('41 MD) and grandfather (1900 MD) both practiced medicine and surgery in two rooms on the lower level, it was my childhood dream to follow in their footsteps. When I started medical school

Although I lived with a middle-class Pakistani family in a comfortable home, the scene on the street was shockingly different. More than half of the population were children and the widespread poverty made it impossible to provide adequate food and shelter. It was not safe to drink the city water and a flush toilet was available to only a small segment of society. Diarrhea was a major problem infecting most everyone, including me. Children were particularly at risk for the complications of dehydration and sepsis, and, too often, death.

When I returned to campus, I knew a career change — a path more focused on public health — was in order for me. During all the upheaval of the 1960s, the advent of Medicare and Medicaid, and the legislative initiatives for human rights and equal access to education, changing health care outcomes seemed inevitable. I wanted to be part of that change. But, what course would I take?

After graduation, I was commissioned to the U. S. Public Health Service and stationed in Tahlequah, Oklahoma, the capital of the Cherokee Nation. Our hospital staff agitated for more resources to impact the widespread health disparities in our indigenous population.

Two years later, I was fortunate to marry N. Lynn Eckhert, a physician who was equally committed to pediatrics and public health. Together, we moved to Baltimore for a program that combined clinical and public health training, leading to certification in pediatrics and a master's degree in public health for me and a doctorate in public health for Lynn.

Our shared public health focus led us to travel with our three children to unique clinical settings in the U.S. and abroad. We started with short-term experiences, first on the Navajo Reservation at the USPHS Hospital in Shiprock, New Mexico, and

later, in a small mission hospital in northern Haiti. As our children matured, we relocated for a year to Harare, Zimbabwe, where Lynn and I taught at the University of Zimbabwe Medical School, while our children attended local schools. We came to see this year as the highlight of our professional careers.

I have been blessed to live through some turbulent times and yet see the world become a healthier place, with the gaps in world health outcomes steadily diminished. Diarrhea is no longer a major cause of childhood demise.

Looking back, Northwestern provided the education and mentoring at a critical time in my development to expand my horizons and fulfill a stimulating career in global health and clinical pediatrics. To be able to appreciate these opportunities with my wife and children over five decades has been immensely rewarding.

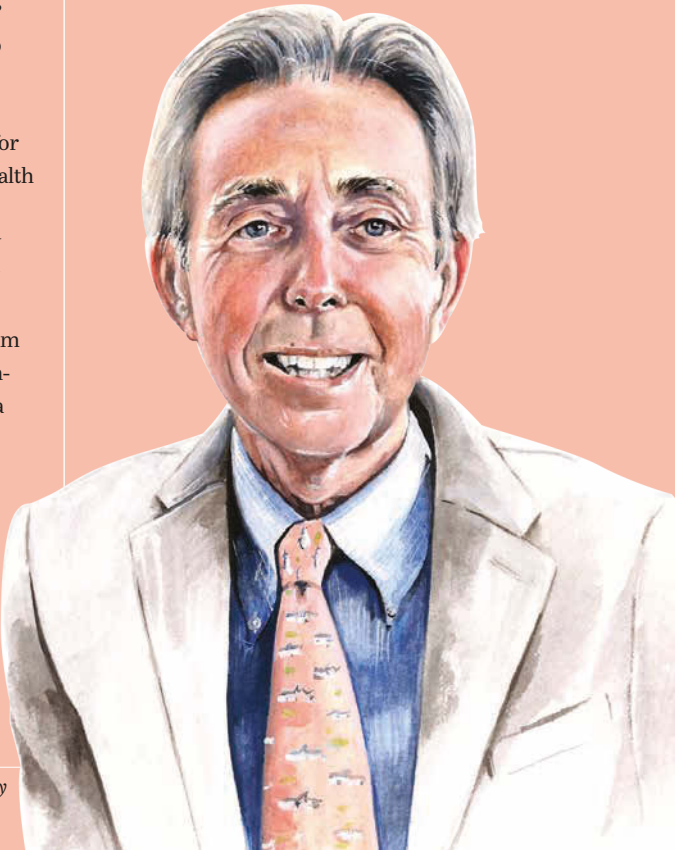


ILLUSTRATION BY *Brianna Ashby*

More research was needed... And for me, a career change was in order.

in the fall of 1965, I was interested in unfolding the mysteries of medical genetics. I spent my summers in the research labs of

the late, highly regarded biochemical geneticist and pediatrician David Y.Y. Hsia, MD.

As I was entering my third year, Dr. Hsia called me in to discuss a federal grant from what is now called the Department of Health and Human Services, funding a three-month pediatric research project, including a ticket to travel around the world on Pan American World Airways.

To my surprise, I would be studying diarrheal diseases of children. I had thought common diarrhea was a disease of the past associated with poor sanitation and lack of personal hygiene. My education on Chicago's North Side was centered on the advances in medical research in the United States; world health data did not seem applicable to my training. Six months later, however, my world view changed when I arrived in Karachi, Pakistan.



Officially opened in 1927, the Ward Building was the world's first "skyscraper" medical center.

1925

The Montgomery Ward Memorial Building

THE RISE OF NORTHWESTERN'S MEDICAL CENTER

Images courtesy of Galter Health Sciences Library & Learning Center, Northwestern University Feinberg School of Medicine

Nearly a century ago, Northwestern began construction on the Montgomery Ward Memorial Building, marking the medical school's move to its present location. Elizabeth Ward, who gifted more than \$8 million in memory of her late husband, the Chicago merchant A. Montgomery Ward, is pictured above during the groundbreaking ceremonies on May 8, 1925.

The Ward Building, which was the world's first "skyscraper" medical center,

stood as an anchor of Northwestern's growing Chicago campus. Upon its official opening in 1927, critics praised the building's pioneering design. "The Montgomery Ward Memorial Building itself is a decided step forward in the development of scholastic buildings in this country," wrote *The American Architect*.

Read how Northwestern carries on that tradition today with the opening of the Simpson Querrey Biomedical Research Center on page 18.

MORE ONLINE AT MAGAZINE.NM.ORG.

