



Northwestern Medicine

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SUMMER 2023

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Chan Zuckerberg Biohub
accelerates collaborative science

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Comprehensive Care and Education

The Department of Anesthesiology is committed to improving the future of the field through innovative research and the development of its future leaders. Northwestern has a long tradition of graduating competitive and well-trained anesthesiologists, including Lindsay Tremper, MD, a senior resident who is pictured here setting up for a general anesthesia case.

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Features



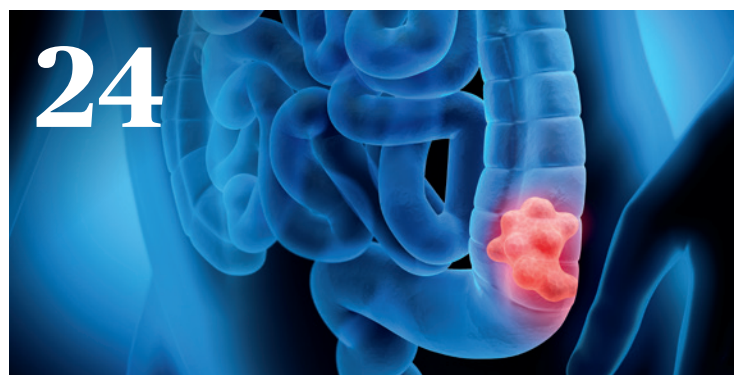
THE BIOLOGY OF BEHAVIOR

Northwestern scientists probe the complex, intertwined nature of brain circuitry and behavior patterns to better understand decision making, habit formation, neurological disorders, and mental illness, with hopes of developing novel therapeutics.



TURNING RESEARCH INTO ACTION

As chair of the Department of Medical Social Sciences, Rinad Beidas, PhD, is building bridges to transform health and healthcare delivery equitably and to ensure that discoveries are translated into action for our communities.



COLONOSCOPIES JUST GOT SMARTER

A new AI system helped Northwestern Memorial Hospital physicians who performed colonoscopies to remove 13 percent more adenomas, the most common type of colorectal polyp.



BIOHUB FOR BREAKTHROUGHS

Chicago is home to a new Chan Zuckerberg Initiative biomedical research hub, uniting investigators across universities to study human tissue with unprecedented resolution and detail.

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ON THE COVER

The new CZ Biohub Chicago is located at Fulton Labs in the city's Fulton Market neighborhood and will include state-of-the-art laboratories, meeting spaces, faculty-in-residence, a biofoundry, and other sophisticated instrumentation. Read more on page 28.

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New Frontiers



WE ARE NOT THE FIRST TO NOTE THAT BIOMEDICAL SCIENCE IS UNDERGOING A REVOLUTION

driven by rapidly evolving tools, technologies, and datasets available to physicians and scientists.

Evolution may be a better term for 2023, as artificial intelligence (AI) advances and human understanding adapts. On our Chicago campus, through Feinberg's Institute for Artificial Intelligence in Medicine and the Northwestern Medicine Mansueto Innovation Institute, and through investigator-driven studies, we are working to appreciate how this developing technology may have implications for discovery, digital health records, diagnostics, therapeutics, care delivery, and more.

AI represents the future of healthcare, and while today's version may have flaws and must be applied responsibly, it

“Biomedical science gets better every time we expand our horizons to new disciplines, technologies, and collaborations.”

will certainly get much better as it trains and develops.

Northwestern's biomedical leaders recently participated in a wonderful panel discussion at Feinberg called “Discussing New Frontiers in Biomedicine,” in which some of our brightest minds converged to discuss wide-ranging topics related to improving and transforming human health. AI was a constant thread, as was the remarkable progress being made collaboratively across many disciplines as we seek answers together, leveraging every technology available to science and medicine.

In this issue, readers will learn about this progress in AI and discover more remarkable interdisciplinary work.

In “Colonoscopies Just Got Smarter (page 24),” we share how gastroenterologists at Northwestern Memorial Hospital are leveraging a leading-edge AI tool to increase the quality of routine colonoscopies, catching more colon cancers early. This is just one of many ways Northwestern is bringing the early benefits of machine learning and interdisciplinary collaboration to benefit patients today.

We also share a story of the boundary-breakers and changemakers involved in the Chan Zuckerberg Biohub Chicago (page 28), a new cross-institution initiative that will bring together investigators from Northwestern, University of Chicago, and the University of Illinois Urbana-Champaign to better understand inflammation and immune cell function in unprecedented detail and resolution. This important work could have implications across a wide range of conditions, including autoimmune diseases and cancer.

In the “Biology of Behavior,” on page 16, our work to unravel how the activity of neurons translates into human

behavior spans the fields of neuroscience, neurology, psychiatry, biology, and pharmacology — particular areas of strength for Northwestern. Earlier this year, the medical school launched the Center for Psychiatric Neuroscience, a collaborative hub that will unite this work, which spans both basic science and translational research. Ultimately, we hope to understand neural mechanisms and develop novel therapeutics that can help treat mental illness and neurological disorders.

Insights and innovations that come from these studies require the help of Feinberg's Department of Medical Social Sciences, where investigators help ensure that data-driven insights improve the health of our communities and society equitably. At the helm of the department is Rinad Beidas, who shares her vision for the future in this issue (page 20). Uniting disciplines and institutions is key to creating equity, and we look forward to seeing how she builds these bridges to improve how we deliver healthcare.

How will AI change the future of these stories? We can't be sure. But the truth is, biomedical science gets better every time we expand our horizons to new disciplines, technologies, and collaborations. We are confident that AI — as a tool that augments the practice of medicine and enhances discovery — will be no exception.

With warm regards,

Eric G. Neilson MD

Vice President for Medical Affairs
Lewis Landsberg Dean
Northwestern University Feinberg School of Medicine

Howard B. Chrisman, MD

President and Chief Executive Officer
Northwestern Memorial HealthCare

Feinberg Again Ranks Among Top Medical Schools in the Nation

“I am grateful to be working with world-class faculty, staff, students, and trainees who work tirelessly every day to drive our mission forward to improve the health of people at the bedside and in the laboratory beyond the individual patient.”

Eric G. Neilson, MD

Northwestern University Feinberg School of Medicine has again been recognized as one of the best medical schools in the nation, ranking 13th among research-oriented institutions, according to the latest *U.S. News & World Report* rankings, released this spring.

This is the 16th year in a row that Feinberg has placed in the top 20 of research-oriented medical schools. The 2024 rankings featured a significantly changed methodology in response to criticism of the rankings' methodology and the decision of some law schools and medical schools to opt out of participating in the ranking process.

“We are pleased to be recognized among the nation's best medical schools,” said Eric G. Neilson, MD, vice president for Medical Affairs and Lewis Landsberg Dean. “While the factors

involved in external recognition may vary from year to year, it does not change our approach. We are committed to our annual internal measures of academic success. Our focus on patients first, breakthrough discovery, innovation, and superb medical education remain our highest priorities. I am grateful to be working with world-class faculty, staff, students, and trainees who work tirelessly every day to drive our mission forward to improve the health of people at the bedside and in the laboratory beyond the individual patient.”

This year, seven of Feinberg's specialty programs were also recognized among the best in the nation. Obstetrics and gynecology ranked 8th, surgery ranked 10th, pediatrics and anesthesiology both ranked 14th, radiology and psychiatry both ranked 16th, and internal medicine ranked 23rd.

Physician assistant (PA) programs, last ranked in 2019, also saw updated rankings this year, with Feinberg's PA program ranking 8th in the nation, previously ranked 26th. Schools of public health also ranked this year, with Feinberg's program ranking 28th.

The *U.S. News* research rankings are based on federal research awards, survey assessments completed by deans and senior faculty at peer institutions, and entering class data. The magazine surveyed the nation's 192 schools of medicine or osteopathic medicine. This year's list also incorporated a number of changes to the methodology used to calculate the rankings, including measuring the total dollar amount of National Institutes of Health grants awarded to an institution.

RESEARCH BRIEFS

DISEASE DISCOVERIES

HOW AGGRESSIVE THYROID CANCER EVOLVES



Northwestern Medicine scientists have shed new light on how the deadliest form of thyroid

cancer transforms from slow-growing to aggressive, according to research published in the *Journal of Clinical Investigation*.

Led by Ruli Gao, PhD, assistant professor of Biochemistry and Molecular Genetics, investigators sought to understand how anaplastic thyroid cancer develops from indolent, or slow-growing, thyroid cancer. The scientists performed high-throughput RNA sequencing and targeted DNA sequencing

and integrated their in-house data with large-scale bulk transcriptome and DNA datasets from the Cancer Genome Atlas database.

They identified two key cell types associated with the progression of cancer: mesenchymal anaplastic thyroid cancer cells (mATCs) and inflammatory anaplastic thyroid cancer cells, or iATCs. The new cell subtype identified, iATC, is the trigger for the transformation from indolent to aggressive thyroid cancer, Gao said.

This work was supported by Northwestern University, the Robert H. Lurie Cancer Center of Northwestern University, the MD Anderson Cancer Center, and a grant from the Mark Foundation for Cancer Research.

SCIENTIFIC ADVANCES

Understanding the Role of Octopamine in Neurodegeneration



Although octopamine, the major “fight-or-flight” neurotransmitter in invertebrates, is still found in the mammalian brain in trace amounts, its function has been replaced by epinephrine and its role in the human brain is not well understood.

Northwestern Medicine scientists have discovered how octopamine communicates with other cells in mammalian brains to prevent cell death. The research was published in the *Proceedings of the National Academy of Sciences*.

Investigators first set out to understand how astrocytes, which make up the majority of cells in the human central nervous system, contribute to brain dysfunction in neurodegenerative diseases. In astrocyte cultures

from the cerebral cortex of mice, scientists found that introducing octopamine at certain levels prompted the production of lactate in the astrocytes, promoting cell survival.

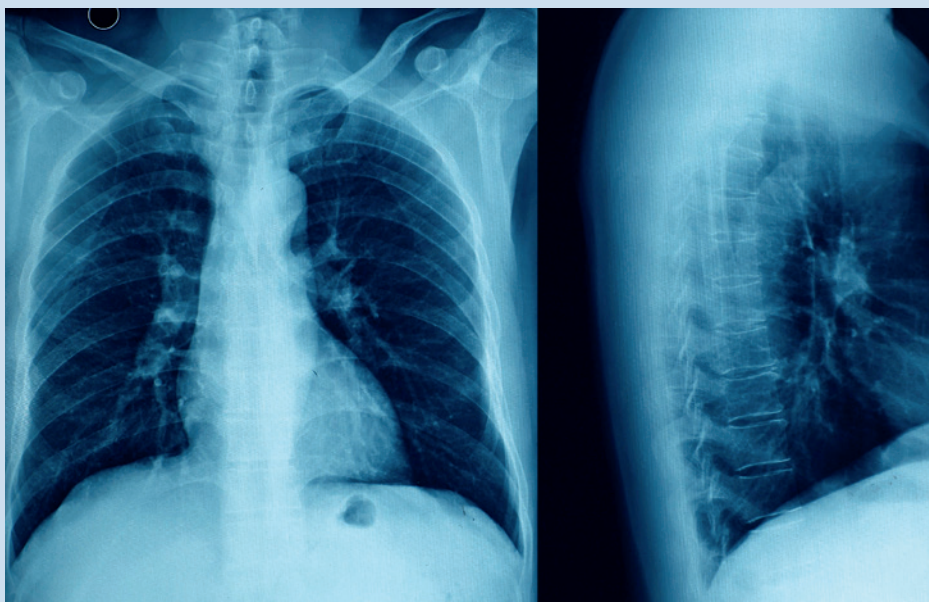
“Neurons that are stressed send out this signal to astrocytes to send them energy, to send lactate,” said study senior author Gabriela Caraveo PISO, PhD, assistant professor in the Ken and Ruth Davee Department of Neurology Division of Movement Disorders. “At the right level, octopamine allows astrocytes to read this distress signal and start making energy, which will protect the cells from death.”

This study was supported by the Northwestern University Clinical and Translational Sciences Institute, the Parkinson's Foundation, and the National Institute of Neurological Disorders and Stroke Grant R01 NS117750.



“AT THE RIGHT LEVEL, OCTOPAMINE ALLOWS ASTROCYTES TO READ THIS DISTRESS SIGNAL AND START MAKING ENERGY, WHICH WILL PROTECT THE CELLS FROM DEATH.”

GABRIELA CARAVEO PISO, PHD



DISEASE DISCOVERIES

Secondary Bacterial Pneumonia Drove Many COVID-19 Deaths



Secondary bacterial infection of the lung (pneumonia) was extremely common in patients with COVID-19,

affecting almost half the patients who required support from mechanical ventilation. By applying machine learning to medical record data, scientists at Northwestern Medicine found that secondary bacterial pneumonia that does not resolve was a key driver of death in patients with COVID-19. The results were published in the *Journal of Clinical Investigation*.

Bacterial infections may even exceed death rates from the viral infection itself, according to the findings. The scientists also found evidence that COVID-19 does not cause a “cytokine storm,” so often believed to cause death.

“Our study highlights the importance of preventing, looking for, and aggressively treating secondary bacterial pneumonia in critically ill patients with severe pneumonia, including those with COVID-19,” said senior author Benjamin Singer, MD, the Lawrence Hicks Professor of Pulmonary Medicine in the Department of Medicine and a Northwestern Medicine

“OUR DATA SUGGESTED THAT THE MORTALITY RELATED TO THE VIRUS ITSELF IS RELATIVELY LOW, BUT OTHER THINGS THAT HAPPEN DURING THE ICU STAY, LIKE SECONDARY BACTERIAL PNEUMONIA, OFFSET THAT.”

pulmonary and critical care physician.

The investigators found nearly half of patients with COVID-19 develop a secondary ventilator-associated bacterial pneumonia.

“Those who were cured of their secondary pneumonia were likely to live, while those whose pneumonia did not resolve were more likely to die,” Singer said. “Our data suggested that the mortality related to the virus itself is relatively low, but other things that happen during the ICU stay, like secondary bacterial pneumonia, offset that.”

The study was supported by the Simpson Querrey Lung Institute for Translational Sciences and grant U19AI135964 from the National Institute of Allergy and Infectious Diseases of the National Institutes of Health.

CLINICAL BREAKTHROUGHS

CT SCAN BEST AT PREDICTING HEART DISEASE RISK IN MIDDLE AGE



CT scans are better at predicting a middle-aged person's risk for a heart disease, such as a heart attack, than genetics, reports a Northwestern

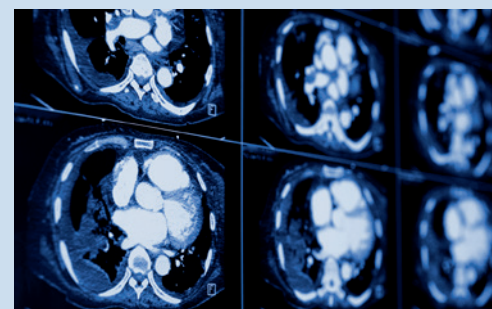
Medicine study published in *JAMA*.

“Finding the best way to identify who is at risk for developing heart disease can help determine what needs to be done to lower their risk,” said lead study author Sadiya Khan, '09 MD, '14 MSc, '10, '12 GME, assistant professor of Medicine in the Division of Cardiology and of Preventive Medicine.

Currently, conventional measures of risk-factor levels, such as blood pressure and cholesterol, are used by doctors to determine a person's likelihood of developing coronary heart disease or blockages of the arteries in the heart. But some people may experience a heart attack, or related heart problem, without one of those conventional factors picking it up.

It was posited that polygenic risk scores — a compilation of more than 6 million commonly occurring genetic variants associated with heart disease — could be used as a potential breakthrough for personalized medicine. But the Northwestern study directly compared genetics and CT scans for coronary artery calcium and demonstrated that the CT scan does a better job than genetics at predicting risk for heart disease in middle age.

The study was supported by grant R01HL159250 from the National Heart, Lung, and Blood Institute of the National Institutes of Health.



SCIENTIFIC ADVANCES



BEST PRACTICES FOR STUDYING SEX-BASED DIFFERENCES IN COMPLEX TRAITS AND DISEASE



Northwestern Medicine investigators led by Barbara Stranger, PhD, associate professor of Pharmacology, developed a

guide outlining best practices for studying and testing for sex-dependent genetic effects, with their recommendations published in the journal *Cell*.

“The simplest thing we can do to consider sex as a potential influence on any kind of trait, disease, or relationship is to disaggregate our data by male and female study participants. The problem with not doing these kinds of analyses means that you miss the opportunity for a more personalized-by-sex answer to whatever question you may have,” Stranger said.

Stranger and her colleagues recommend performing specialized quality control of genetic data and the use of tailored statistical models for data analysis. For example, when considering the contribution of genetic variants on the X chromosome to complex traits, investigators need to apply specific quality control and statistical models to account for the unique characteristics and inheritance of the X chromosome.

The authors also emphasize the importance of testing genetic models and mechanisms contributing to sex differences through the application of different approaches, such as heritability, genetic correlation, and polygenic risk score analyses.

This work was supported by National Institutes of Health grants R01 CA229618 and R01 HG011405.

CLINICAL BREAKTHROUGHS

Powerful Chemotherapy Drug Reaches Brain Tumors in Humans Using Novel Ultrasound Technology



A major impediment to treating the deadly brain cancer glioblastoma has been that the most potent chemotherapy can't permeate the blood-brain barrier to reach the aggressive brain tumor.

But now Northwestern Medicine scientists have reported results of the first in-human clinical trial, published in *The Lancet Oncology*, in which they used a novel, skull-implantable ultrasound device to open the blood-brain barrier and repeatedly permeate large, critical regions of the human brain to deliver chemotherapy that was injected intravenously.

The four-minute procedure to open the blood-brain barrier is performed with the patient awake, and patients go home after a few hours. The results show the treatment is safe and well tolerated, with some patients getting up to six cycles of treatment.

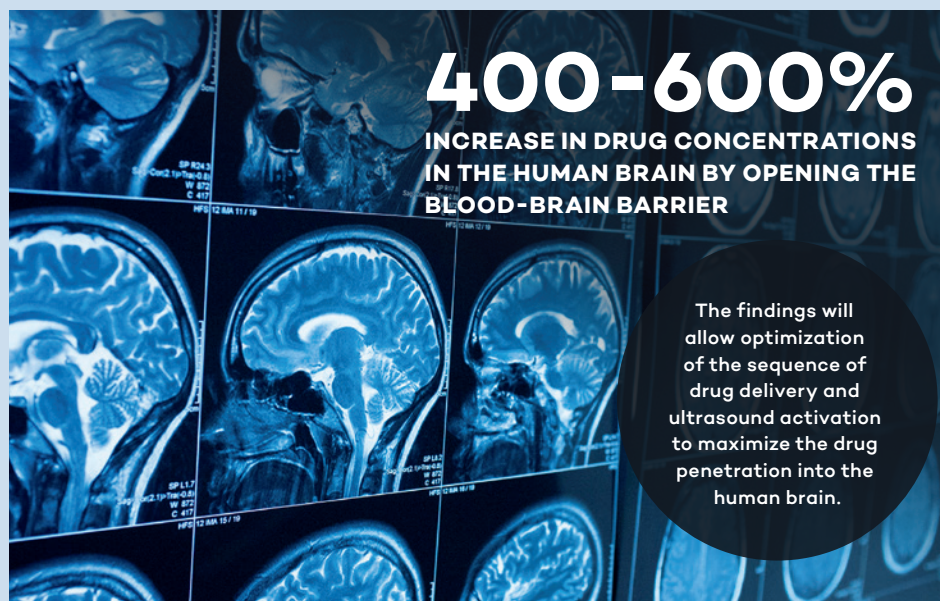
This is the first study to successfully quantify the effect of ultrasound-based blood-brain barrier opening on the

concentrations of chemotherapy in the human brain. Opening the blood-brain barrier led to an approximately four- to six-fold increase in drug concentrations in the human brain, the results showed.

Scientists led by Adam Sonabend, MD, associate professor of Neurological Surgery and a Northwestern Medicine neurosurgeon, observed this increase with two different powerful chemotherapy drugs, paclitaxel and carboplatin. The drugs are not used to treat these patients because they do not cross blood-brain barrier in normal circumstances.

In addition, this is the first study to describe how quickly the blood-brain barrier closes after sonication. The findings will allow optimization of the sequence of drug delivery and ultrasound activation to maximize the drug penetration into the human brain.

This work is funded by the grants 1R01CA265969-01A1 and P50CA221747 from the National Cancer Institute of the National Institutes of Health, the Lou and Jean Malnati Brain Tumor Institute of the Lurie Cancer Center, SPORC support from the Moceri Family Foundation and the Panattoni family.



SCIENTIFIC ADVANCES

IMPROVING CRYSTAL ENGINEERING WITH DNA



Northwestern investigators have demonstrated that fine-tuning DNA interaction strength can improve colloidal crystal engineering to enhance crystals' use in creating an array of functional nanomaterials, according to a study published in *ACS Nano*.

Chad Mirkin, PhD, professor of Medicine in the Division of Hematology and Oncology, the George B. Rathmann Professor of Chemistry at Northwestern's Weinberg College of Arts and Sciences, and director of the International Institute for Nanotechnology, was senior author of the study.

Colloidal crystal engineering with DNA involves modifying nanoparticles into programmable atom equivalents, or "PAEs," which are used to form colloidal crystals that can then be used for designing



programmable, synthetic DNA sequences.

Most recently, this process has focused on controlling crystal size and shape. However, even with established methods, it can be difficult to separate crystal formation, or nucleation, and growth.

In the study, Mirkin's team explored how DNA interaction strength can be used to separate nucleation and growth in colloidal crystallization. To do this, the team created two groups of complementary nanoparticles: one batch containing complementary base pairs, called "seed" PAEs, and the other

containing mismatched base pairs to make "growth" PAEs. The seed particles formed a solution, and then the growth particles grew on top of them.

Using this method, the investigators were able to improve crystal uniformity. They could also independently select the nanoparticle and the DNA shell sequence and essentially mix and match them, allowing them to incorporate different types of materials into the crystals.

This material is based upon work supported by the Air Force Office of Scientific Research Award FA9550-17-1-0348 and FA9550-22-1-0300.

SCIENTIFIC ADVANCES

How Hormones Influence Anemia



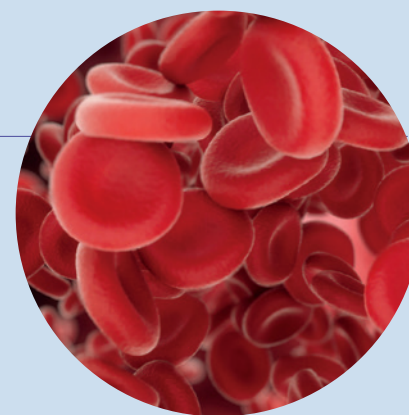
Scientists have uncovered how peptides produced by bones during inflammation prevent anemia in mice, according to a recent study, led by Valentin David, PhD, the Frank Krumlovsky, MD, Professor of Medicine in the Division of Nephrology and Hypertension and published in the journal *Blood*.

Inflammation, a feature of many chronic illnesses, is known to lead to the concomitant increased production and cleavage of fibroblast growth factor 23 (FGF23), a hormone previously linked to iron dysregulation. Particularly in patients with chronic kidney disease, the increase of FGF23 is associated with a reduction in iron levels, leading

to anemia and increased morbidity.

To better understand the role of carboxy terminal FGF23 peptides, or C-terminal FGF23 (Cter-FGF23), investigators first set out to identify which cells produce it under inflammatory conditions. Using mouse models, investigators induced acute inflammation and found that mature osteocytes, a type of bone cell, were the main producers of C-terminal FGF23.

To better understand the role of Cter-FGF23 peptides in the regulation of iron, scientists then developed a mouse model with an osteocyte-specific deletion of the *FGF23* gene and observed that circulating iron levels dropped by 90 percent compared to levels in wild-type mice. An injection of



Cter-FGF23, however, restored iron levels to normal, according to the study.

The findings could represent a new treatment direction for anemia and bone mineral disorder in chronic kidney disease.

The study was supported by grants from the National Institute of Health: R01DK102815, R01DK114158, R01DK132657, R01DK101730, R01DK131046, R01DK132342, R01-DK124220, R01-HL148012 and R01-HL150729.

Faculty Recognized for Contributions to Science

Six Feinberg faculty have recently been elected members to the nation's most prestigious honorary societies: the National Academy of Sciences, the American Academy of Arts and Sciences, and the National Academy of Medicine.

DEVELOPING PHARMACEUTICAL THERAPIES



Richard B Silverman, PhD
National Academy of Sciences

The Patrick G. Ryan/Aon Professor in the Department of Chemistry in the Weinberg College of Arts and Sciences and of Pharmacology, Silverman focuses his research on central nervous system disorders,

including amyotrophic lateral sclerosis (ALS), Alzheimer's disease, Parkinson's disease, and epilepsy, and on cancer, including melanoma and hepatocellular carcinoma. He is the inventor of Lyrica, a breakthrough drug marketed by Pfizer for epilepsy, fibromyalgia, and neuropathic pain, as well as another drug treating children with infantile spasms, a third drug in clinical trials for tuberous sclerosis and infantile spasms, and a fourth drug in IND review for ALS.

ADVANCING KIDNEY HEALTH



Susan Quaggin, MD
American Academy of Arts and Sciences

Quaggin is the chief and Charles Horace Mayo Professor of Nephrology and Hypertension in the Department of Medicine and also director of the Feinberg Cardiovascular and Renal Research Institute.

Quaggin has conducted extensive research related to kidney health. Her work in molecular biology around transcription factor action within developing kidneys has helped improve mouse models used to study kidney disease. Her research has also spurred new protocols for renal assessments and led to new insights into pre-eclampsia.

DISCOVERING NEW DIRECTIONS IN CANCER TREATMENT



Ali Shilatifard, PhD
American Academy of Arts and Sciences

Shilatifard is the Robert Francis Furchgott Professor and chair of Biochemistry and Molecular Genetics. He is also director of the Simpson Querrey Institute for Epigenetics. Shilatifard's research focuses on the

causes of childhood leukemia through chromosomal translocations. His laboratory has also discovered novel mechanisms underlying transcription elongation, the process of synthesizing RNA from DNA.

Studies from Shilatifard's laboratory linking epigenetic factors and transcription elongation control to malignancies have provided new therapeutic approaches for cancer treatment.

PIONEERING ADVANCES IN BIOANALYTICAL TECHNOLOGY



Shana Kelley, PhD
American Academy of Arts and Sciences

Kelley is the Neena B. Schwartz Professor in the Departments of Chemistry, Biomedical Engineering, and Biochemistry and Molecular Genetics. She is also the president of the Chan Zuckerberg Biohub Chicago

(read more on page 28). Her research centers on bioanalytical technology development which spans a variety of disciplines. She and her collaborators have pioneered new methods of tracking molecular and cellular analytes with unprecedented sensitivity. A successful inventor and entrepreneur, she holds more than 50 patents worldwide and has founded four molecular diagnostics companies.

FURTHERING MEDICINE THROUGH BIOMATERIALS, NANOTECHNOLOGY



Guillermo Ameer, ScD
American Academy of Arts and Sciences

Ameer is the Daniel Hale Williams Professor of Biomedical Engineering and of Surgery, as well as director of the Center for Advanced Regenerative Engineering. Ameer's laboratory develops biomaterials and nanotechnology for

regenerative engineering, tissue engineering, medical devices, drug delivery, and cell delivery applications. Ameer and his collaborators pioneered the development of citrate-based antioxidant biomaterials referred to as polydiolcitrate. Ameer has been named an American Association for the Advancement of Science fellow as well as a National Academy of Inventors fellow. He is also an elected member of the National Academy of Medicine.

UNDERSTANDING NEURODEGENERATIVE DISORDERS



Dimitri Krainc, MD, PhD
National Academy of Medicine

Krainc is the chair and Aaron Montgomery Ward Professor of Neurology and also directs the Simpson Querrey Center for Neurogenetics. Throughout his distinguished career, he has studied the molecular mechanisms of neurodegenerative disorders that have paved the way for novel therapeutics.

His group uncovered key pathogenic mechanisms across different neurodegenerative diseases, such as Huntington's disease and Parkinson's disease. His research group was the first to demonstrate dysregulated gene expression early in the pathogenesis of Huntington's disease. He has founded two biotech companies that are developing targeted therapies for Parkinson's and related disorders.

Faculty Inducted into Prominent Medical Societies

Five Feinberg faculty members have been inducted into the American Society for Clinical Investigation (ASCI) and the Association of American Physicians (AAP), two of the oldest medical honor societies in the United States.

This year's ASCI inductees include Josh Levitsky, MD, '08 MS, professor of Medicine in the Division of Gastroenterology and Hepatology; Huiping Liu, MD, PhD, associate professor of Pharmacology and of Medicine in the Division of Hematology and Oncology; and Daniela Ladner, MD, MPH, the John Benjamin Murphy Professor of Surgery and vice chair of research and innovation in the Department of Surgery.

This year's AAP inductees are Stephanie Eisenbarth, MD, PhD, chief of Allergy and Immunology in the Department of Medicine and the Roy and Elaine Patterson Professor of Medicine; and Leonidas Platanias, MD, PhD, the Jesse, Sara, Andrew, Abigail, Benjamin and Elizabeth Lurie Professor of Oncology and director of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University.



Honoring the Class of 2023

J.P. Leshock, '23 MD, was first inspired to become a doctor after reading through his grandfather's medical journals from his time serving as a doctor in the military. Now a graduate of Feinberg, Leshock said he's excited to take his passion for empathetic patient care on to the next phase of his career.

"Graduating medical school today just proves that the impossible is possible. It's always been a dream of mine to become a doctor and it's always been something that's way out there in the distance," said Leshock, who will soon begin his residency in anesthesiology at Northwestern. "That moment is finally here."

Feinberg honored the MD Class of 2023 during the medical school's 164th commencement ceremony held in the Aon Grand Ballroom at Navy Pier on May 15.

This year's commencement opened

with remarks from Eric G. Neilson, MD, vice president for Medical Affairs and Lewis Landsberg Dean, who welcomed graduating medical students, faculty, family, and friends to the ceremony.

"This afternoon, we take a moment to reflect and celebrate our graduates and their last four years of inspired effort as they ready themselves for professional life," Neilson said. "As you begin the process of training in your chosen specialty, it is also a time for pride and acknowledgment."


Michael H. Schill, JD, president of Northwestern University, encouraged students to take the lessons they learned at Feinberg on to their professional lives.

"You are now called upon to treat the sick, to bring comfort to those in pain," Schill said. "Your career will be challenging. But like all noble pursuits — and I can't think of any more noble than being a doctor —

it will also be rewarding. I look forward to seeing all that you will do to transform the field of medicine and to shape and improve the health and life of our communities near and far."

George Q. Daley, MD, PhD, dean of Harvard Medical School and the Caroline Shields Walker Professor of Medicine, delivered this year's commencement address and emphasized the importance of incorporating health equity into every patient interaction.

"Let's take the inspiration from our medical heroes but recognize that achieving health equity will require all of your efforts," Daley said. "For us to mitigate health disparities, we must consider health equity at every stage of biomedical innovation, from the initial setting of scientific priorities to the delivery of cures to the global community."



"Your career will be challenging. But like all noble pursuits — and I can't think of any more noble than being a doctor — it will also be rewarding."

MICHAEL H. SCHILL, JD
PRESIDENT OF NORTHWESTERN UNIVERSITY



“Each one of us started this journey with nothing more than a single humble spark of excitement.”

DANIEL MATHEW, '23 MD



Graduates cited the Declaration of Geneva (left) and celebrated at a reception at Navy Pier.



We all, and you all especially in your careers, will have a role to play.”

Sandra Sanguino, MD, MPH, senior associate dean for medical education, then presented the members of the class of 2023, who crossed the stage to receive their diplomas and doctoral hoods from either a faculty mentor or physician family member.

Daniel Mathew, '23 MD, addressed his classmates and spoke on the importance of prioritizing joy in everyday life.

“Each one of us started this journey with nothing more than a single humble spark of excitement,” Mathew said, and highlighted the experiences both inside and outside of medical school that shaped him and his classmates. “All of these things together are what make us exceptional physicians who will be relatable and resilient. And so, I urge you, as we enter the next phase of our training to keep that joy as your central focus.”

To end the ceremony, Neilson led the new graduates in reciting the Declaration of Geneva, the modern declaration of the physician’s oath, and the same they took as first-year medical students at Founders’ Day.

Thirty-three graduating students were inducted into the Alpha Omega Alpha medical honor society. Six students received Magna Cum Laude in Scientia Experimentalis, and ten received Cum Laude in Scientia Experimentalis. Eight students graduated Summa Cum Laude, eight graduated Magna Cum Laude, and eight graduated Cum Laude.

Many also took advantage of Feinberg’s dual-degree programs: Four graduates received a Master’s Degree in Business Administration, three earned a Master’s Degree in Medical Humanities & Bioethics, three received a Master’s Degree in Public Health, and 13 completed

a PhD through the Medical Scientist Training Program.

“Feinberg has given me so many opportunities to prepare me for becoming a doctor,” said Anu Venkatesh, '23 MD, who will begin her residency in child psychiatry at the University of Colorado in the fall. “I love education, I love taking care of people, and I love learning and science. Medicine was the field that really fit everything, and I’ve experienced all that at Northwestern.”

Nonye Ogbuefi, '23 MD, said the day was also a celebration of family. “This moment is a culmination of a lot of hard work,” said Ogbuefi, who will return to Northwestern in the fall for her residency in dermatology. “My mom is a physician herself and watching her help her patients has inspired me to become a doctor. I’m so excited to be able to help my patients and be that person for my patients in the community.”

CRISPR Pioneer Delivers Inaugural Kimberly Prize Lecture

Jennifer A. Doudna, PhD, the Li Ka Shing Chancellor's Chair in Biomedical and Health Sciences and professor of Biochemistry, Biophysics and Structural Biology at the University of California, Berkeley, delivered the inaugural Kimberly Prize Lecture to Feinberg faculty, staff, fellows, and students on April 4.

The Kimberly Prize, given by Kimberly Querrey in honor of her late husband, Lou Simpson, is awarded every year to a scientist who has made outstanding research contributions into the molecular basis of life with a direct demonstrated link of their discovery into clinic for the betterment of humankind.

Doudna received the prize for her fundamental biochemical research providing



molecular insight into the function of CRISPR/Cas9 systems as tools for genome editing and the application of her work to science and medicine. In 2020, Doudna and Emmanuelle Charpentier, PhD, received the Nobel Prize in Chemistry for co-developing CRISPR-mediated genome editing.

During her lecture, Doudna gave an overview of the last decade of CRISPR discoveries and developments.

"It is powerful technology. Over the last decade or so, it's been developed for not only disrupting genes or replacing genes, but also for controlling transcription. That means controlling the output of genes, diagnosing the presence of different kinds of nucleic acids like RNA and DNA, including during the pandemic, when CRISPR was developed in a number of groups for detection of the SARS-CoV-2 virus, and for molecular imaging," Doudna said.

"It is powerful technology. Over the last decade or so, it's been developed for not only disrupting genes or replacing genes, but also for controlling transcription."

JENNIFER A. DOUDNA, PHD



Above: Eric G. Neilson, MD; Kimberly Querrey; Doudna; and Ali Shilatfard, PhD.
Above Bottom: Doudna greets Feinberg students and signs copies of her biography.
Top Right: Doudna presents in the Hughes Auditorium.
Photos by Steven Serio.

**LURIE CHILDREN'S HOSPITAL
FIRST IN ILLINOIS TO BE
DESIGNATED AS A RARE
DISEASE CENTER OF
EXCELLENCE**



NU Docs Program Inspires the Next Generation of Physicians



Northwestern recently hosted a cohort of 16 undergraduate students from historically underrepresented groups for an immersive week-long introduction to careers in medicine.

In partnership with Northwestern Health Professions Advising and the Weinberg College of Arts and Sciences, the NU Docs program is designed to prepare promising candidates early in the career journey with the support that they need to successfully apply to and enroll in medical school.

The week of programming included specialty talks from faculty,



a panel of admissions advisors, and resident and medical student panels. Undergraduate students were also provided first-hand views into the daily life of physicians through clinical shadowing and research workshops.

Ann & Robert H. Lurie Children's Hospital of Chicago is the first in Illinois to receive designation as a National Organization for Rare Disorders (NORD) Rare Disease Center of Excellence, becoming one of 40 U.S. academic medical centers selected to be a part of the first-of-its-kind national network of U.S. medical institutions dedicated to diagnosing,

treating, and researching all rare disease, helping meet the unmet needs of more than 25 million Americans. Because patient numbers battling a specific rare disease are so small (fewer than 200,000), physician expertise and research and development funds are sorely lacking. As a result, 95 percent of the more than 7,000 different rare diseases are without treatments.

WOMEN IN MEDICINE CONFERENCE CELEBRATES COMMUNITY

Women in the medical field and their allies gathered at Northwestern Memorial Hospital on March 24 for the fifth annual Women in Medicine conference. The theme of this year's day-long conference was "The Joy and Power of Our Community," featuring presentations and panels on harnessing community to empower women in medicine and advocate for gender equity in healthcare.

"This conference was born out of a need to support and celebrate women in medicine. It was also born out of a need to address some systemic issues that face women and those underrepresented in medicine," said Cybele Ghossein, MD, vice chair for Academic and Faculty Affairs in the Department of Medicine and a co-organizer of the conference.

Howard Chrisman, MD, Chief Executive Officer of Northwestern Memorial HealthCare, promised to continue listening to women physicians to reduce burnout, improve employee wellbeing, and ensure healthcare providers are recognized and respected for their work.

"When we think about work-life integration, to me, it's recognizing we need to be more flexible, and that's defined in a variety of ways. But it is a part of the conversation — we need to be more agile," Chrisman said to attendees. "All of us live in a world where we have outside interests, and we have families, and we have spouses that perhaps work. At the end of the day, at least for me, it's hard to trump family... So, part of my role is to really create that way."

Panels also discussed the importance of physician advocacy to improve access to abortion, the importance of communities for women in science and medicine, and the benefits of mentorship.



Angira Patel, MD, MPH, '10, '11 GME, associate professor of Pediatrics and a co-organizer of the Women in Medicine conference, greets attendees.

MEDIA SPOTLIGHT



npr

'Hidden Fat' Puts Asian Americans at Risk for Diabetes. How Lifestyle Changes Can Help

Asian Americans and Pacific Islanders have higher rates of diabetes than whites, and are prone to developing Type 2 diabetes at younger ages and lower body weights than the general US population. Among Asian subgroups, the risk for diabetes is especially high among South Asians, Filipinos, and Pacific Islanders. There's a known link between overweight and obesity and diabetes risk. But Asians in America are 40 percent more likely to be diagnosed with diabetes, compared with the white population — despite having lower average BMIs. While researchers are pushing for more answers, doctors want to help reduce people's risk now.

Namratha Kandula, MD, MPH, professor of Medicine, is the principal investigator of the South Asian Healthy Lifestyle Intervention study. "In addition to diet and exercise, we specifically address the stress that comes from being an ethnic minority in this country — what happens when you immigrate to a different environment and lose your social support and social connection," she says.

The Washington Post

There's No Such Thing as Generic Ozempic or Wegovy

The FDA is warning consumers to steer clear of weight loss drugs sold through compounding pharmacies, some of which are being marketed as "generic" Ozempic and Wegovy. As the FDA noted in its warning, there are no generic versions of these drugs. The products being offered by some pharmacies and weight loss clinics might not work — and could even be dangerous. That's a message consumers really need to hear.

There is a need to increase production for these drugs, but in the meantime, shortages make it hard for people to find their next month's supply, and they may start "feeling desperate, and when they feel desperate, they start doing things they wouldn't normally do," says Robert Kushner, MD, professor of Medicine. That could mean driving 75 miles to the one pharmacy that has the drug in stock, as one of Kushner's patients was forced to do, or it might mean turning to a pharmacy selling a "generic."

CNN

Teens Who Lost Weight After Bariatric Surgery Had Weaker Bones Afterward, Study Says

The bones of teens and young adults who lost significant weight after bariatric surgery were weaker than those of youth with similar levels of obesity who did not have surgery, a new study published in *Radiology* found. Significant weight loss for any reason causes bones to weaken as the body adjusts to the new reality of not carrying extra weight, said Thomas Inge, MD, PhD, surgeon-in-chief and director of the adolescent bariatric surgery program at Ann & Robert H. Lurie Children's Hospital of Chicago.

The New York Times

To Prevent Heart Attacks, Doctors Try a New Genetic Test

Suppose your young patient has a score indicating a heart attack is likely, perhaps a few decades or more later. If that patient starts taking a statin right away, as opposed to in midlife, will a heart attack be prevented? Sadiya Khan, MD, MSc, Magerstadt Professor of Cardiovascular Epidemiology, emphasized the need for more research.

Khan published a study in *JAMA* that showed in middle-aged to older adults, CT scans of the heart, which can show the buildup of plaque, are better than genetics in predicting risk. But that leaves a question about how to manage risk in young people, who almost never have visible plaque on a CT scan, even if they are at greater danger for a heart attack later in life. "We need more studies that focus on younger people with follow-up over several decades," she says.

Stronger bones are necessary to support the 100 or more extra pounds of weight that teenagers have when they're severely obese, so it's not surprising that the bones of teens who lost that much weight would weaken, said Justin Ryder, PhD, associate professor of Surgery and Pediatrics. "If you think about it, they have basically taken a big, heavy backpack off of themselves," Ryder says. "So, they need to find a way to put some of that weight back on the bones through strength and resistance training."

FACULTY AWARDS & HONORS



Three Feinberg faculty members have been inducted into the American Society for Clinical Investigation (ASCI):

• **Josh Levitsky, MD, '08 MS**, professor of Medicine in the Division of Gastroenterology and Hepatology.

• **Huiping Liu, MD, PhD**, associate professor of Pharmacology and of Medicine in the Division of Hematology and Oncology. 📍 1

• **Daniela Ladner, MD, MPH**, the John Benjamin Murphy Professor of Surgery and vice chair of research and innovation in the Department of Surgery. 📍 2

Two Feinberg faculty members have been inducted into the Association of American Physicians (AAP):

• **Stephanie Eisenbarth, MD, PhD**, chief of Allergy and Immunology in the Department of Medicine and the Roy and Elaine Patterson Professor of Medicine. 📍 3

• **Leonidas Platanias, MD, PhD**, the Jesse, Sara, Andrew, Abigail, Benjamin and Elizabeth Lurie Professor of Oncology and director of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University. 📍 4

• **Mercedes Carnethon, PhD**, the vice chair and Mary Harris Thompson Professor of Preventive Medicine and of Medicine in the Division of Pulmonary and Critical Care, has been awarded the Paula H. Stern Award for Outstanding Women in Science and Medicine by the Northwestern Medical Women Faculty Organization. 📍 5

• **Sandra Weintraub, PhD**, professor of Psychiatry and Behavioral Sciences in the Division of Psychology and associate director of the Northwestern Alzheimer's Disease Research Center in the Mesulam Center for Cognitive Neurology and Alzheimer's

Disease, was recently appointed to the Illinois Supreme Court Commission on Elder Law.

• **Daniel Arango, PhD**, assistant professor of Pharmacology and member of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University, was among just 15 scientists named Searle Scholars for 2023. The Searle Scholars Program supports high-risk, high-reward research in the biomedical sciences and chemistry. 📍 6

• **Mario Shields, PhD**, research assistant professor of Medicine in the Division of Hematology and Oncology, has received the first Robert H. Lurie Comprehensive Cancer Center of Northwestern University Diversity Scholars Award, established to actively support the growth and success of high-achieving, academically ambitious postdoctoral fellows and non-tenure track faculty who are

underrepresented in medicine.

• **Eric Russell, MD**, professor of Radiology, Neurological Surgery, Otolaryngology, and Neurology in the Ken and Ruth Davee Department of Neurology, received the lifetime achievement award from the American Board of Radiology for his decades of service in education.

• **Joseph Bass, MD, PhD**, the Charles F. Kettering Professor of Medicine and chief of Endocrinology, Metabolism and Molecular Medicine in the Department of Medicine, was awarded the Roy O. Greep Award for Outstanding Research from the Endocrine Society for his contributions to research in endocrinology, and also received the Sleep Research Society's Outstanding Scientific Achievement Award, which recognizes a seminal research discovery that has significantly impacted the sleep and circadian research field.

• **Vitaliy Poylin, MD**, associate professor of Surgery, was a recipient of the 2023 Northwestern Medicine Humanitarian Award.

• **Senta Berggruen, MD**, associate professor of Radiology and Medical Education, was awarded the Society of Abdominal Radiology's Inaugural Diversity Equity and Inclusion Achievement Award.

Each year, Feinberg's Medical Faculty Council recognizes the importance of mentorship with the Mentor of the Year Award. This year's recipients include:

• **Judith Moskowitz, PhD, MPH**, professor of Medical Social Sciences, and

• **Daniela Ladner, MD, MPH**, the John Benjamin Murphy Professor of Surgery and vice chair of research and innovation in the Department of Surgery.

Feinberg's chapter of the Alpha Omega Alpha (AOA) medical honor society welcomed new faculty members in a ceremony on March 15, recognizing outstanding educational achievement and significant contributions to medicine:

• **Apkar Apkarian, PhD**, director of the Center for Translational Pain Research and professor of Neuroscience, Anesthesiology and Physical Medicine and Rehabilitation 📍 7;

• **Brenda Bohnsack, MD, PhD**, the Lillian Sherman Cowen Reiger and Harold L.S. Cowen Research Professor of Pediatric Ophthalmology and chief of Pediatric Ophthalmology in the Department of Ophthalmology;

• **Daniel Borja-Cacho, MD, '22 MSc**, assistant professor of Surgery in the Division of Organ Transplantation; and

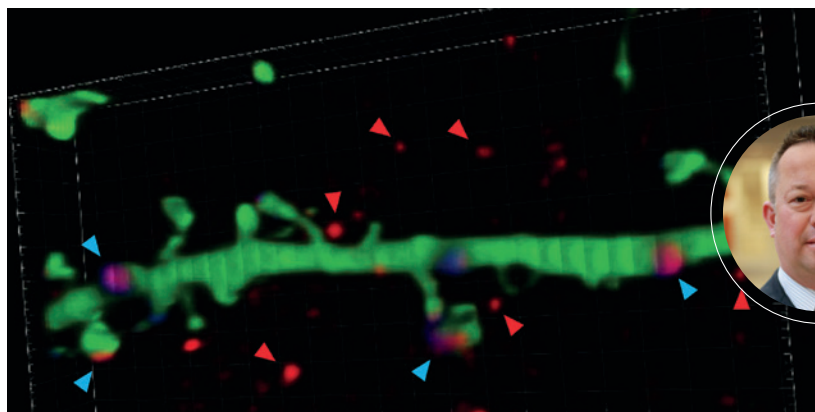
• **Patricia Franklin, MD, MPH, MBA**, of Medicine in the Division of Rheumatology and of Orthopaedic Surgery.



Written by Olivia Dimmer

THE BIOLOGY OF BEHAVIOR

*Northwestern scientists probe the
molecular underpinnings of human
behavior and neurological disorders*



Peter Penzes, PhD, and his team have uncovered how social deficits and seizures in a subtype of autism are caused by overexcited brain circuits.

Understanding how the activity of the billions of neurons in our brain translates to human behavior — from micro decisions to compulsive habits — has been a huge, decades-long investigation. Yet many of these molecular mechanisms remain elusive even to the scientists and doctors studying them.

To accelerate discovery at the intersection of neuroscience and behavior, Feinberg recently launched the Center for Psychiatric Neuroscience, a collaborative hub created to unite interdisciplinary scientists to understand neural mechanisms underlying mental illness and develop novel therapeutics.

Sachin Patel, MD, PhD, chair of the Department of Psychiatry and Behavioral Sciences, and the Lizzie Gilman Professor of Psychiatry and Behavioral Sciences, will serve as director of the Center for Psychiatric Neuroscience.



“Cultivating a Department of Psychiatry integrated with robust translational neuroscience research is extremely important for the future of our field.”

Sachin Patel, MD, PhD

“Cultivating a Department of Psychiatry integrated with robust translational neuroscience research is extremely important for the future of our field,” Patel says. “This is a unique opportunity to synergize with the existing neuroscience infrastructure including the Departments of Neuroscience, Pharmacology, Neurobiology and other areas to establish a center that’s really at the intersection between mental health and neuroscience.”

In addition to serving as a platform for recruiting new faculty to Feinberg, the center will be a focal point for current Northwestern faculty with an interest in using neuroscience approaches to better understand pathophysiological mechanisms of mental illness.

The new center builds on recent high-impact research at Northwestern Medicine, which highlights the complex, intertwined nature of brain circuitry and behavior patterns.

BREAKTHROUGHS IN AUTISM

An estimated 1 in 36 children in the U.S. live with autism, according to the Centers for Disease Control and Prevention, and roughly 1 percent of the world’s population has autism spectrum disorder.

In the laboratory of Peter Penzes, PhD, director of the Center for Autism and Neurodevelopment and the Ruth and Evelyn Dunbar Professor of Psychiatry and Behavioral Sciences, multiple new studies have uncovered the complex relationship between genetics and the molecular mechanisms underlying behavior in autism disorders.

Recently, Penzes and his team have uncovered how social deficits and seizures in a subtype of autism are caused by overexcited brain circuits. In a study published in *Nature Communications*, they found that a subtype of

autism called 16p11.2 duplication syndrome was linked to increased levels of the gene *PRRT2* in mice, causing seizures and abnormal social behaviors.

When levels of *PRRT2* were reduced in the duplicated region, brain activity in mice returned to normal, expected social behavior was restored, and seizures decreased.

Because the gene *PRRT2* regulates how neurons talk to each other, inhibiting synapses or connection points between neurons could help treat both seizures and autism symptoms in this syndrome, says lead author Marc Forrest, PhD, research assistant professor of Neuroscience and lead author of the study. This approach could also be used more broadly in other types of neurodevelopmental disorders with brain over-activation, which has been shown in other subtypes of autism.

“Our work now shows that we can focus our efforts on targeting the *PRRT2* pathway for novel therapies, and these could potentially cure core symptoms of 16p11.2 duplication syndrome,” Forrest says. “If we learn how the 16p11.2 duplication causes illness, maybe we can also learn more about what causes autism in general and create better treatments.”

Penzes and his collaborators have also identified new biomarkers within patients’ cerebrospinal fluid (CSF) for a type of autism, according to a study published in the journal *Neuron*.

This biomarker’s presence helps establish a link between autism and epilepsy, conditions which often co-occur but whose conjunctive mechanisms remain unclear. For example, people with autism with mutations in the gene *CNTNAP2* also have epilepsy. Normally, this gene creates a cellular adhesion protein which helps neurons connect to one another, but



Investigators led by Julia Cox, PhD, research assistant professor of Neuroscience, have shed new light on the neural mechanisms that influence how differences in sex and past experiences inform decision making.

loss-of-function mutations have been associated with both autism and epilepsy.

In the *Neuron* study, Penzes and his collaborators analyzed CSF from both people with autism and a control group, finding that people with autism had fewer molecules of *CNTNAP2* floating freely in the CSF. When *CNTNAP2* is freely floating, it functions more like a hormone than a cellular glue, Penzes says, binding to neurons and reducing excitatory neurotransmitters. Therefore, *CNTNAP2* may play a secondary role as a regulator of excitatory activity.

The team also studied another genetic mutation, this time in the gene *SHANK3*, which led to the development of a new therapy for Phelan-McDermid syndrome, a subtype of autism spectrum disorder (ASD).

Phelan-McDermid syndrome is known to be caused by a specific genetic mutation in *SHANK3*, a well-known ASD candidate gene. Penzes' team developed a derivative of an insulin-like growth factor-binding protein, IGFBP2, which is found in structures of the brain affected by ASD and has been shown to improve neuroplasticity and cognitive functions.

In a study published in *Molecular Psychiatry*, the investigators administered the IGFBP2-derived peptide, called JB2, to mice with *SHANK3* mutations. Through advanced brain imaging, they found that the drug improved neuroplasticity, behavior impairments, and cellular processes in the mice's brains.

These changes were directly correlated with improvements in the mice's learning and memory skills, motor function, and communication through ultrasonic vocalizations. While the drug is still in early stages, Penzes says, physicians could theoretically routinely administer the drug into patients' bloodstreams.

BRAIN CIRCUITRY AND SEX DIFFERENCES IN DECISION-MAKING

Humans make thousands of decisions each day — from what to eat to whom to marry. Research has shown that decision-making behaviors vary by sex, but the exact neural mechanisms that mediate these differences have remained poorly understood.

Investigators led by Julia Cox, PhD, research assistant professor of Neuroscience, have shed new light on the neural mechanisms that influence how sex and past experiences inform decision making, according to findings published in *Nature Neuroscience*.

In the study, investigators gave mice the choice of two levers to press: one yielded a reward, the other did not. Through trial and error, the mice ultimately used their past experiences to figure out which lever was more likely to give them a reward. Once the mice were trained in this task, the investigators performed two different experiments. In the first, the team implanted optic fibers into the mice brains, allowing investigators to decrease neuronal activity with a light-activated protein and determine how these changes in neuronal activity influenced the mice's behavior.

In the second experiment, the team used miniaturized high-resolution microscopic lenses while the mice performed tasks, which allowed investigators to use advanced imaging techniques and analyze when subsets of neurons were activated during the tasks.

While all the mice exhibited similar behavior, Cox and her collaborators noticed one stark difference: Female mice were more strongly influenced by "action value," or how likely one is to receive a reward for an action based on past experiences, than male mice.

"The initial goal of this experiment was not to find a sex difference, so we were pretty surprised by that," Cox says.

Cox's team also found that inhibiting activity in neurons that project from the anterior cingulate cortex to the dorsomedial striatum — both areas of the brain essential for decision-making — disrupted the relationship between value and motivation in the female mice.

After replicating these experiments with human participants, the investigators discovered that female participants were also influenced by the action value of previous tasks and were slower to reengage in the task based on whether or not the previous task yielded a positive outcome.

"In that regard, there are similarities," Cox says. "I think that more broadly, when studying sex differences in laboratory animals, even if the behavioral differences don't always end up translating to humans, it's possible that some of the differences in the neural circuits still are consistent across species."

DOPAMINE'S LINK TO HABIT FORMATION

Compulsive behavior is a hallmark of both addiction and obsessive-compulsive disorder, which can cause a person to have urges that trigger intensely distressing feelings or perform repetitive behaviors that are unwanted and can interfere with daily life.

Northwestern investigators have discovered that dopamine signaling in the brain's dorsomedial striatum promotes the development of compulsive behaviors in animal models, according to findings published in *Current Biology*.

The striatum, a cluster of neurons within

the basal ganglia that are responsible for controlling movement and reward-seeking behaviors, is connected to the brain's cerebral cortex via corticostriatal circuits. Prior research suggested these circuits control the expression of compulsive behaviors commonly observed in obsessive-compulsive disorder (OCD) and substance use disorders.

While corticostriatal circuits were thought to be involved, the precise mechanisms that cause compulsive behaviors to emerge have remained unclear.

Talia Lerner, PhD, assistant professor of Neuroscience and senior author of the study, hypothesized that dopamine activity, which regulates the plasticity of corticostriatal circuits, played a crucial role in this process.

In the study, investigators studied dopamine activity in two regions of the brain's striatum: the dorsomedial striatum and the dorsolateral striatum, both involved in different types of reward learning. The dorsomedial striatum is involved with goal-oriented learning behaviors, while the dorsolateral striatum is involved with habitual behaviors.

Although it was previously thought that habit played a role in compulsion, the team was surprised to find that dopamine signaling activity was actually upregulated in the mice's dorsomedial striatum, where it predicted the development of compulsive reward-seeking behavior.

The investigators then used excitatory and inhibitory optogenetics — which uses light to change the activity of neurons — to manipulate the activity of dopamine neurons in the dorsomedial striatum. They found that stimulating dopamine signaling in the dorsomedial striatum increased compulsive reward seeking,

while inhibiting dopamine signaling in the dorsomedial striatum decreased compulsive reward seeking, confirming that the associations they had observed were causal.

The findings can help scientists understand the root causes behind compulsive behaviors, which may help physicians better determine which management strategies will work best for individual patients.

AGGRESSION AS A DIAL, NOT A SWITCH

Aggression between members of a species is as old as time, but involves careful calculations, Ann Kennedy, PhD, assistant professor of Neuroscience, wrote in an essay published in *Science*.

Fighting can leave an animal injured, so it's safer to start out with aggressive posturing, and only escalate to outright fighting if an opponent doesn't back down. Scientists therefore expect aggressive arousal to build over time and to persist even after a fight is over, but how this is accomplished in the brain is still relatively unknown.

To better understand this process, Kennedy and her colleagues used head-mounted miniaturized microendoscopes to characterize the activity of neurons in the ventrolateral portion of the ventromedial hypothalamus as mice freely interacted.

The investigators observed the activity in these cells was only weakly correlated with the mice's actions. But by fitting the data with a dynamical systems model, they uncovered a subset of neurons showing gradual ramping of their activity, including persistent firing after a fight ended.

When the activity of these neurons was weak, mice investigated or ignored one another, but as the activity grew, so did



"It's not a decision to attack, but it's like this scalable knob of how 'angry' the mouse is, that gets cranked up over the course of an interaction."

Ann Kennedy, PhD

aggressive posturing, such as dominance mounting. When activity in the neurons peaked, mice began to attack. Furthermore, mice that never fought showed only weak ramping activity of these neurons, whereas intense fighters showed strong and long-lasting ramping.

Kennedy's research suggests the signals present in these neurons reflect a level of aggressive motivation and argues that the scalable and persistent activity within the ventrolateral portion of the ventromedial hypothalamus is a mechanism for setting an animal's motivational state.

"We had this question: 'What makes us behave differently when we're angry or hungry? How does the brain encode these internal motivational states?'" Kennedy says. "What we found was if you look at activity of these hypothalamic neurons, you can pull out this signal that gradually ramps up over the course of an aggressive counter and is correlated with animals' overall level of aggression. It's not a decision to attack, but it's like this scalable knob of how 'angry' the mouse is, that gets cranked up over the course of an interaction." ❖



Talia Lerner, PhD, assistant professor of Neuroscience, hypothesized that dopamine activity, which regulates the plasticity of corticostriatal circuits, played a crucial role in causing compulsive behaviors to appear.



TURNING RESEARCH INTO ACTION

BY CHRISTINA FRANK

As chair of the Department of Medical Social Sciences, Rinad Beidas, PhD, is building bridges to transform health and healthcare delivery equitably and to ensure that discoveries are translated into impact for our communities.

Even as a child, Rinad Beidas, PhD, felt strongly about social justice and healthcare as a human right. Her family had immigrated from the Middle East when she was 2 years old, relocating to Evanston so her mother could complete her master's degree at Northwestern's School of Communication. Then, her family moved to New York so her father, a physician, could complete his infectious disease training in an academic medical center that served a large and diverse urban population deeply affected by structural inequities. He would tell her stories every night about his patients and their difficulty accessing high-quality healthcare in a timely manner.

"I just couldn't wrap my head around the fact that not everybody had equal access to high-quality healthcare," Beidas says.

Now, Beidas brings that passion to her role as chair of the Department of Medical Social Sciences.

"We leverage the tremendous power of the social and behavioral sciences — such as psychology, sociology, anthropology, and economics — to create and apply innovations that improve the health of our community and our society equitably," says Beidas, who is also the Ralph Seal Paffenbarger Professor of Medical Social Sciences. "Given that most seemingly intractable problems in health and healthcare are those of human behavior within social environments, our department is well positioned for impact."

ENSURING DISCOVERIES HAVE AN IMPACT

While working on her PhD in clinical psychology at Temple University, Beidas became interested in implementation science, a field that was just beginning to coalesce at the time.

"I realized that instead of developing new programs, what really lit my fire was making evidence-based practices accessible and available to all," Beidas says. "We tend as a society to focus on developing and funding



"We tend as a society to focus on developing and funding discovery, but we don't always pay as much attention to what it's going to take to actually realize the impact of those discoveries."

Rinad Beidas, PhD

discovery, but we don't always pay as much attention to what it's going to take to actually realize the impact of those discoveries."

Beidas completed her PhD in 2011 and then joined the faculty at the University of Pennsylvania Perelman School of Medicine. She became the founding director of the Penn Implementation Science Center from 2017 to 2022, growing a top-five program in implementation research and education, and also led the Penn Medicine Nudge Unit, the first behavioral design team embedded within a health system, bringing those insights to clinical care delivery.

While at Penn, Beidas partnered with the Department of Behavioral Health and Intellectual disAbility Services in Philadelphia, an organization that oversees public behavioral health service delivery. There, she focused on understanding which factors made it more likely for clinicians to use evidence-based practices with young people seeking services within the public behavioral health system.

"I learned that organizational factors are

incredible drivers of whether or not clinicians use evidence-based practices," she says. That includes both organizational culture and leaders' abilities to support the deployment of innovations within that climate.

While at Penn, in addition to her early work on pediatric behavioral health, Beidas also expanded her focus to study implementation in cancer, HIV, and cardiovascular disease, driven by methodological questions that transcended interventions, diseases, or settings. She is particularly proud of her work related to firearm injury and mortality prevention.

In 2013, a member of Beidas's family died by suicide using a firearm. The tragedy occurred shortly after Beidas's son was born. "I remember taking my son to the pediatrician and having a lightbulb moment when the doctor asked me about smoke alarms and car seats and safe sleeping, but didn't ask me any questions about secure firearm storage," Beidas says. "This insight and lived experience really galvanized an entire program of research, which I'm excited to continue to grow at Northwestern."



“We have all the tools that can make it possible for our health systems to achieve their objectives to transform healthcare for all and make sure that the patient voice is amplified and that all patients have an exceptional experience.”

Pediatric visits are an ideal time to talk to parents about secure firearm storage, yet few primary care clinicians do so, even though evidence-based programs exist. Beidas and her team carefully adapted an existing evidence-based program in partnership with parents who own firearms, firearm safety experts, and healthcare clinicians and leaders. The program includes a brief discussion between parents and pediatric clinicians on the importance of secure firearm storage. Free firearm cable locks are also made available to all parents.

Currently, Beidas is completing a study in collaboration with Henry Ford Health and Kaiser Permanente Colorado in 30 pediatric clinics testing the comparative effectiveness of a “nudge” in the electronic health record to remind clinicians to ask about secure storage and offer a cable lock versus a nudge plus providing ongoing support to clinics around how best to implement this program. This work incorporates a behavioral economic perspective, which focuses on making it easy to change behavior by leveraging insights on how humans make decisions.

“Overall, in this study, we’re seeing a high percentage of the more than 40,000 well-child visits included a discussion around secure storage and offering cable locks,” Beidas says. “This has the potential to engender new

research focused on the different settings where we can address secure firearm storage, including health systems, schools, and community organizations. Given that firearms are now the leading cause of death for young people in the United States, identifying effective strategies to reduce unauthorized access to firearms is a key modifiable determinant that can save lives.”

BUILDING BRIDGES

In September 2022, Beidas was named chair of the Department of Medical Social Sciences, making her one of the 18 percent of female chairs within medical schools in the United States.

“It’s a tremendous honor to serve as chair of the only Department of Medical Social Sciences in the country,” she says. “I am grateful for the incredible department that founding chair Dr. David Cella built, and to have the opportunity to lead MSS into its next chapter. This is a really exciting time to be at Northwestern because of the significant investment in implementation science made by the Feinberg School of Medicine in launching the Institute for Public Health and Medicine’s Center for Dissemination and Implementation Science led by Dr. Sara Becker.”

She’s excited to work with the department’s 75 scientists, who all bring their lifespan and disease-agnostic expertise to four interrelated divisions to solve problems related to health and healthcare delivery as well as with scientists across Feinberg in various departments through the rich interdisciplinary environment cultivated through cross-departmental centers and institutes.

“First, you need to identify the problem and how to measure it, and we have a cadre of scientists to assist with this in our Division of Outcome and Measurement Science,” she says. “Second, you need to understand which social, biological, behavioral, and developmental factors are associated with that particular problem, which represents the work led by scientists in our Division of Determinants of Health. Third, you need scientists to help design interventions to address multilevel factors contributing to health, which we do in our

Division of Intervention Science. And fourth, once we have interventions that work, the scientists in our Division of Implementation Science systematically study how to scale those interventions and make them available to our communities.”

MSS does this all while putting equity at the center of its efforts.

“MSS is an incredibly special department, where collaboration, innovation, and inclusion are foundational to our work,” Beidas says. “Our members, including faculty, staff, and trainees, take a team science approach to building equitable health and healthcare, and we actively partner in fostering an inclusive work environment and culture of belonging through our Inclusion, Diversity, Equity and Action (IDEA) Committee.”

Beidas sees MSS as a bridge within Northwestern and beyond. One of her main goals is to grow the department’s relationship with departments on Northwestern’s Evanston campus.

“We serve as a bridge to the Evanston campus, and we hope to grow those relationships even more deeply,” she says.

“Building bridges with Evanston allows us access to cutting-edge social science discoveries and bringing them into applied settings.”

Two of the department’s senior faculty lead university-wide research institutes: the Institute for Innovations in Developmental Sciences (DevSci), led by Laurie Wakschlag, PhD, and the Institute for Sexual and Gender Minority Health and Wellness (ISGMH), led by Brian Mustanski, PhD. These boundary-crossing, scientific, community-building initiatives are highly aligned with MSS’s defining focus on transcending disciplinary boundaries for greater impact on human health. MSS faculty also hold leadership roles in the Institute for Public Health and Medicine and the Northwestern University Clinical and Translational Science Institute.

Beidas also sees the department as a bridge to Northwestern Medicine and other healthcare delivery systems in the Northwestern ecosystem, like the Shirley Ryan AbilityLab, the Ann & Robert H. Lurie Children’s Hospital, and the Jesse Brown VA system.

“We have all the tools that can make it possible for our health systems to achieve

“We can leverage the best of our social and behavioral sciences to redesign how we think about delivering patient-centered care.”

their objectives to transform healthcare for all and make sure that the patient voice is amplified and that all patients have an exceptional experience,” she says. “I don’t think there’s ever been a moment where we’ve needed social and behavioral sciences more to help us understand how to improve health and healthcare. We can leverage the best of our social and behavioral sciences to redesign how we think about delivering patient-centered care. Ensuring that discoveries make their way equitably into healthcare delivery systems and the community is the challenge of our time to solve.” ❖

STRENGTHS IN MEDICAL SOCIAL SCIENCES

Feinberg’s Department of Medical Social Sciences, a national leader, strives to transform health through social and behavioral sciences by advancing equity, innovation, and impact. The department faculty use a suite of multi-methods, including quantitative and qualitative analytic methods, to investigate questions of interest. Faculty have deep expertise in clinical trial design and interpretation, including efficacy, effectiveness, and implementation studies.

Beidas is leading the roll out of four new divisions within the department to recognize and grow its strengths, alongside efforts to evolve the research mission to include a stronger focus on equity and implementation science in partnership with sister entities within Feinberg such as the Center for Dissemination and Implementation Science. She is also working to grow the educational mission of the department through a new educational curriculum focused on social and behavioral science methods to transform health.

Outcome and Measurement Science

Faculty within this division strive to improve human health and healthcare through better measurement and evaluation.

Determinants of Health

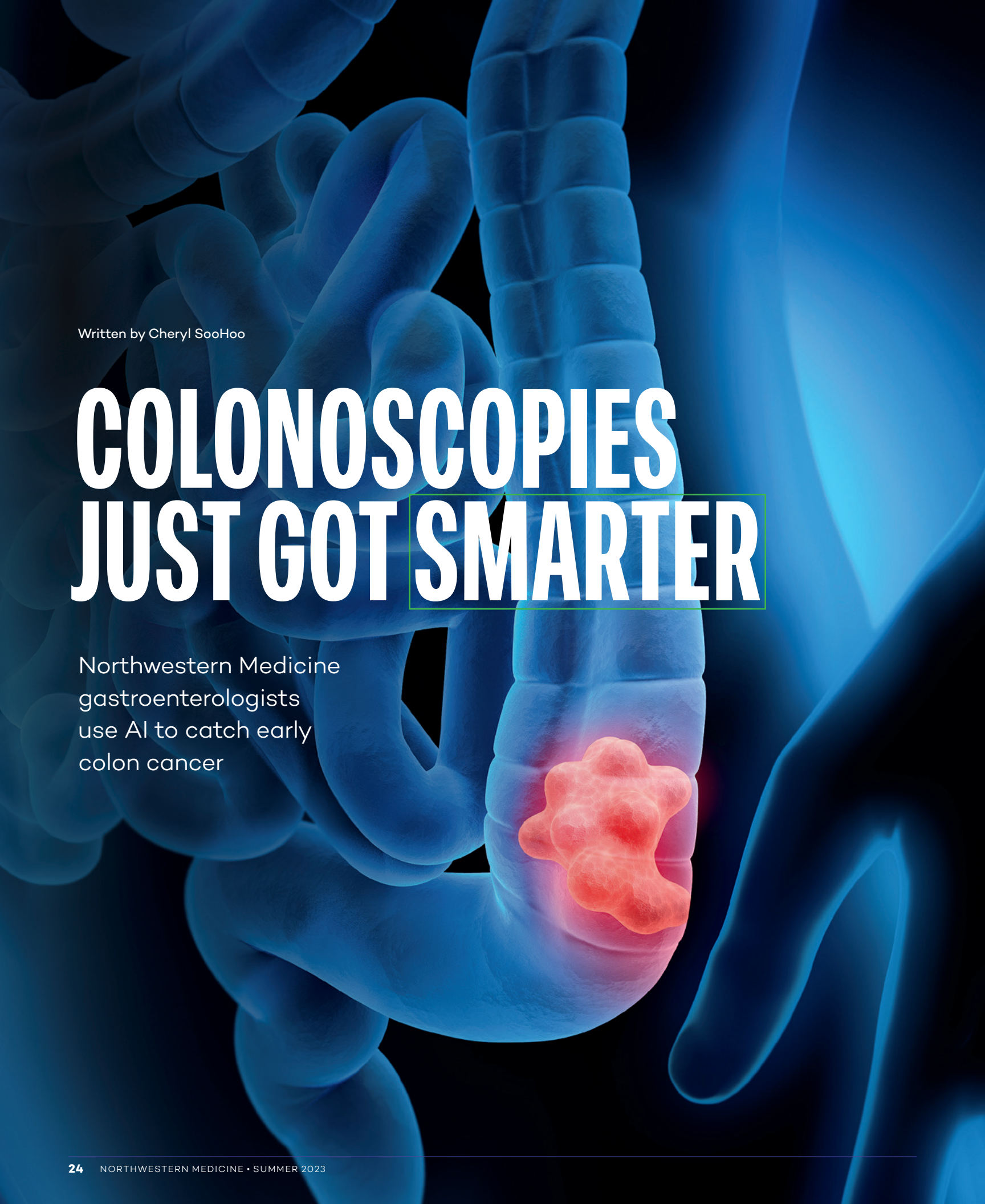
Faculty within this division aspire to elucidate the influence of social, developmental, biological, and behavioral processes on health and disease outcomes.

Intervention Science

Faculty within this division prevent and manage major health conditions by designing, optimizing, and testing interventions to improve health and prevent disease.

Implementation Science

Faculty within this division implement evidence-based practices in health systems and communities by supporting behavior change within organizations and systems.



Written by Cheryl SooHoo

COLONOSCOPIES JUST GOT SMARTER

Northwestern Medicine
gastroenterologists
use AI to catch early
colon cancer

New technology has raised the IQ of routine colonoscopies. The recent introduction of artificial intelligence (AI) in the gastrointestinal (GI) lab is improving the ability of gastroenterologists to spot and remove precancerous colorectal polyps. Aiding physicians to better detect the earliest stages of colon cancer — the second most common cause of cancer death among Americans — AI could be a significant game changer in saving lives.

This May, Feinberg gastroenterologists presented the results of a Northwestern study evaluating an FDA-approved computer-aided polyp detection system called GI Genius — the first commercial product of its kind. The AI helped Northwestern Memorial Hospital (NMH) physicians who performed colonoscopies to remove 13 percent more adenomas, the most common type of colorectal polyp, compared to when the system was not used.

The finding has big implications. Studies have shown that just a 1 percent increase in the adenoma detection rate can result in a 3 percent decrease in the risk of cancer developing within five years of a colonoscopy. The Northwestern investigators' 13 percent finding equates to reducing future colon cancer diagnoses by up to 39 percent.

Often developing after age 45, colon polyps are found in as many as 40 percent of Americans, according to the National Institutes

of Health. While incidences of colon cancer are becoming alarmingly more common in younger people, routine screening exams continue to keep cases of this deadly disease from skyrocketing, according to Rajesh Keswani, MD, '16 MS, associate professor of Medicine in the Division of Gastroenterology and Hepatology and a nationally renowned expert in interventional endoscopy who leads efforts to improve healthcare quality such as the implementation study of the GI Genius.

"Most polyps do not become cancerous, but nearly all colorectal cancers begin as polyps," says Keswani, director of endoscopy at NMH and director of quality for the Northwestern Medicine Digestive Health Center. "Unlike with breast and lung cancers, where the goal is to find cancer early, for colon cancer we are able to not only detect but also remove lesions before they become cancerous by performing high-quality screening colonoscopies."

The invaluable intelligence of the GI Genius proved too good to pass up. By June 1, Northwestern Medicine had become one of the largest health systems in the country to install the AI application in every endoscopy suite in its nine hospitals and four outpatient locations in Chicagoland.

"The results clearly showed the dramatic impact on the performance of our doctors to further improve patient care in our

13% increase in adenoma removals

high-volume clinical environment," says John Pandolfino, MD, the Hans Popper Professor of Medicine and chief of the Division of Gastroenterology and Hepatology in the Department of Medicine. "How could we not implement AI throughout our Northwestern Medicine endoscopy facilities?"

SMART PARTNERSHIP

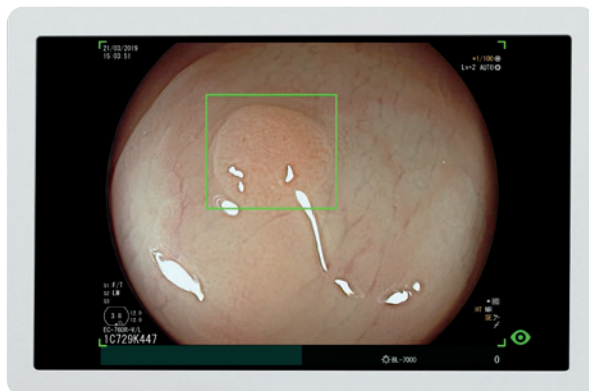
The GI Genius acts as a partner to medical staff. During routine colonoscopies that use the program, a small green box appears on the screen and zeros in on a polyp on the real-time video feed of a patient's colon. Extensive machine learning has taught the AI program to sound an alarm when it recognizes the features of suspicious polyps. Already carefully and expertly looking for subtle growths — potentially cancerous and benign — that can hide behind folds in the intestine, the GI specialist takes a closer look at what the AI has found. Relying on clinical training and experience, the gastroenterologist makes the ultimate decision to remove the abnormal tissue.

"The AI is like having another skilled colleague in the room that can provide a second set of eyes," Keswani says. "AI can serve as mentors, just like attending physicians do for residents learning how to perform colonoscopies."

Featuring one of the busiest endoscopy services in the country, Northwestern Medicine has long maintained a national reputation for providing high-quality screening colonoscopies that exceed national guidelines. With the emergence of AI in clinical care and the gastroenterology field, specifically, Keswani and his colleagues wondered: Could computer-driven applications like GI Genius

39%

potential reduction in future colon cancer diagnoses



Gastroenterologists using the FDA-approved Medtronic GI Genius computer-aided detection system removed more adenomas, the most common type of colorectal polyp.

“For colon cancer we are able to remove lesions before they become cancerous by performing high-quality screening colonoscopies.”

Rajesh Keswani, MD, '16 MS



help already top-performing colonoscopists do an even better job? Could AI reduce variations in the skills, technique, and carefulness of endoscopists to improve the overall detection of polyps in preventing colon cancer?

“Our approach with any change to medical practice is to determine if a new procedure or technology — even though thoroughly studied, approved, and vetted — will actually work for us here at Northwestern Medicine,” Keswani says. “So we took a commercial product and began evaluating it.”

Starting in early 2022, computer-aided detection software was implemented in a few endoscopy suites at a time at Northwestern Memorial, and physicians performing colonoscopies had the choice of using the AI application all of the time, some of the time, or not at

NEW MANSUETO INSTITUTE ACCELERATES INNOVATIONS

Building on the innovative care provided to patients throughout the health system, the new Northwestern Medicine Mansueto Innovation Institute accelerates scientific discovery, enhances delivery of world-class care with superior outcomes, and helps recruit top talent. Made possible by a generous philanthropic donation and launched in 2022, the institute expands the resources available to medical staff members to foster technology innovation, further transforming the healthcare experience at Northwestern Medicine.

“We are extremely excited to provide a physical place for innovators from across the health system to come and advance ideas, partner with startups, and even establish companies that can further the goals and care provided by Northwestern Medicine,”

said Daniel M. Derman, MD, vice president of Innovation at the Mansueto Innovation Institute.

Along with the physical space, the Mansueto Innovation Institute is developing new programs to engage medical staff members across Northwestern Medicine in evaluating startup company and big tech partnership opportunities, pursuing internally developed technology solutions, and fostering ideas from the Northwestern Medicine workforce to realize the future of healthcare delivery and experience.

“The Mansueto Institute will provide a new pathway to help our patients, providers, and employees serve our Patients First mission with the creation and deployment of advanced technology such as machine learning and artificial intelligence,”

said Doug King, senior vice president and chief information officer of the Mansueto Innovation Institute.

Located on the 22nd floor of 541 North Fairbanks in Chicago, the Mansueto Innovation Institute encompasses more than 18,000 square feet of space dedicated to fostering and accelerating innovation. The first phase of the expansion was completed in May, with workspace to house the Northwestern Medicine artificial intelligence, data engineering, and innovation teams in addition to collaboration space for hosting big tech and startup company partners. Future expansion plans include demonstration spaces to showcase and test new technologies and a prototyping lab to provide space for innovators to create new solutions.

INNOVATIVE CHATBOT EXPANDS GI CARE

all. Over a six-month study period, 21 gastroenterologists — about half of the division's faculty — performed 4,820 colonoscopies. Nine of the physicians used the software most of the time, and polyp removal rates significantly increased among the ones who used the AI compared to those who did not.

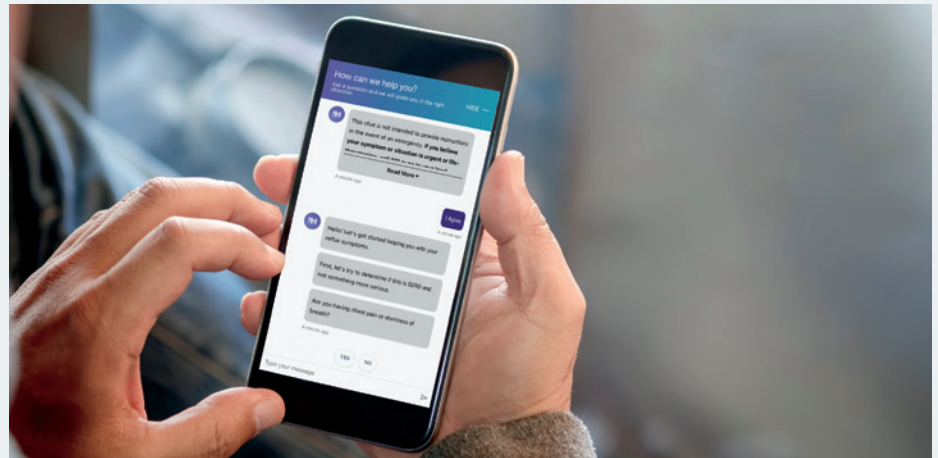
“The 13 percent increase in adenoma polyp detection was a huge number. We would have been happy with 3 to 4 percent,” Keswani says. “The future of quality GI endoscopy is in artificial intelligence. There’s no doubt that it will become the next new standard of care.”

AIMING HIGHER

Northwestern Medicine’s recent investment in AI for detecting colorectal polyps demonstrates the strong commitment of Feinberg faculty to innovate and use emerging “smart” tools in patient care. Pandolfino leads the Artificial Intelligence and Mathematics Program in Gastroenterology (AIM-GI), a first-of-its-kind initiative to develop novel AI platforms to improve GI diagnostics and therapeutics in clinical practice.

Collaborating with biomechanical engineers at Northwestern’s McCormick School of Engineering, such as Neelesh Patankar, PhD, professor of Mechanical Engineering and Engineering Sciences and Applied Mathematics, Feinberg GI investigators are working on a number of AI projects, from developing virtual organs like the esophagus to predictive mathematical modelling of GI diseases and disorders. The AIM-GI program helped fund the GI Genius study as part of its work to enhance endoscopic procedures like screening colonoscopies.

“The use of artificial intelligence is going to have a major impact not only on gastroenterology but also on every medical specialty,” Pandolfino says. “The key to its success in improving patient care will be for us to fully embrace it, help develop it, and be involved in continually refining it.” ❖



“Hello! Let’s get started helping you with your reflux symptoms.” While offering a rather personal first-time greeting, Northwestern Medicine’s new online tool, GERDBot™, gets to the heart of the matter for those seeking help for chronic heartburn, a major symptom of gastroesophageal reflux disease (GERD).

One of the most common gastrointestinal (GI) conditions, GERD impacts quality of life for as much as 20 percent of the U.S. population — with as many as 15 million people experiencing it every day. Simple lifestyle changes and medications can help most people manage the disease. But if left undiagnosed and untreated, persistent acid reflux over time can lead to serious complications, ranging from inflammation and scarring of the esophagus to increased risk of esophageal cancer.

Enter the GERDBot. Last year, the Division of Gastroenterology and Hepatology introduced this innovative online tool to help patients get clinically appropriate GI care from the right specialist at the right time. The algorithm-driven chatbot asks a series of brief questions and assesses if a patient’s reflux is the cause of symptoms and whether they might require care.

“Serving as a touchpoint for our providers, the GERDBot helps us triage patients,” says certified nurse practitioner Gwen Cassidy. Care for the disease varies: For some patients,

over-the-counter antacids may easily resolve their heartburn. For others, more comprehensive services may be needed. With input provided by GERDBot, Cassidy and her team contact patients who meet the criteria for GERD within 72 hours to do a clinical intake call and schedule a telehealth appointment.

With one of the top reflux programs in the world, Northwestern Medicine uses the most advanced technologies to help patients with GERD. But sometimes navigating to the appropriate care can be confusing and time consuming for patients, even with referrals from their primary care provider. Depending on an individual’s GERDBot assessment, Cassidy and her team can quickly help a patient obtain appointments with GI specialists and/or expedite the process for scheduling an endoscopy or other procedures throughout the Northwestern Medicine health system. In some cases, a patient might only need an experienced allied health professional like Cassidy to make minor adjustments to the individual’s plan of care.

“Our goal as a clinically integrated program is to provide efficient and coordinated access to high-quality care,” Cassidy says. “We know how difficult it can be to get a timely appointment with busy practitioners. It can take months. With this chatbot, we can provide patients with expert medical advice in three days’ time.”

Written by Melissa Rohman

BIOHUB FOR BREAKTHROUGHS

Chan Zuckerberg Biohub
accelerates collaborative science



“We’re thrilled to be part of the Chan Zuckerberg Biohub Network, which will galvanize multidisciplinary research and drive more progress than any one of these institutions could have achieved on its own.”

Shana Kelley, PhD



Shana Kelley, PhD, will lead Chan Zuckerberg Biohub Chicago.

This spring, the Chan Zuckerberg Initiative (CZI) announced that Chicago will be the home of its newest biomedical research hub, uniting investigators across universities to study human tissue with unprecedented resolution and detail.

Called the Chan Zuckerberg Biohub Chicago, the hub will be co-led by Northwestern University, along with the University of Chicago and the University of Illinois Urbana-Champaign. The hub will be funded with \$250 million over a decade from CZI, with an additional \$25 million committed by the State of Illinois.

At the helm of CZ Biohub Chicago’s efforts is Shana Kelley, PhD, who will serve as president. Kelley is the Neena B. Schwartz Professor of Biochemistry and Molecular Genetics at Feinberg and of Chemistry and Biomedical Engineering at the McCormick School of Engineering.

CZ Biohub Chicago will be located at Fulton Labs in the city’s Fulton Market neighborhood and will include state-of-the-art laboratories, meeting spaces, faculty-in-residence, a biofoundry, and other sophisticated instrumentation. The goal is to enable cross-collaboration and innovation among the region’s best investigators to better understand inflammation within the body, leading to new treatments and prevention strategies for inflammatory conditions and diseases.

“We’re thrilled to be part of the Chan Zuckerberg Biohub Network, which will galvanize multidisciplinary research and drive more

progress than any one of these institutions could have achieved on its own,” Kelley said. “The scientific challenge we’re exploring — to develop new tools to better measure tissues and gain insights into inflammation — has large engineering challenges to surmount, and is wildly, but not impossibly, ambitious — and can only be solved by interdisciplinary collaboration.”

ASSEMBLING A DREAM TEAM OF INVESTIGATORS

The hub is the first expansion of the Chan Zuckerberg Biohub Network, launched in 2021, and builds off the successes of the CZ Biohub in San Francisco, which was founded in 2016.

The search for the next CZ Biohub was no simple feat and involved a yearlong, highly competitive application process for a research initiative explicitly focused on measuring human biology. Chicago was selected from a pool of 58 teams.

“We are excited to scale this successful model of collaborative science into a larger network by welcoming the new Biohub in Chicago,” said CZI co-founder and co-CEO Priscilla Chan. “This institute will embark on science to embed miniaturized sensors into tissues that will allow us to understand how healthy and diseased tissues function in unprecedented detail. This might feel like science fiction today, but we think it’s realistic to achieve huge progress in the next 10 years. I look forward to the advances in science and technology that this new Biohub will spur in

studying how tissues function to understand what goes wrong in disease and how to fix it.”

The Chicago team’s planning committee comprised investigators across Northwestern, including Kelley; Guillermo Ameier, ScD, professor of Surgery and the Daniel Hale Williams Professor of Biomedical Engineering in the McCormick School of Engineering; Horacio Espinosa, PhD, the James N. and Nancy J. Farley Professor in Manufacturing & Entrepreneurship; Neil Kelleher, PhD, professor of Biochemistry and Molecular Genetics and director of the Chemistry of Life Processes Institute and Proteomics Center of Excellence; Amy Paller, MD, the chair and Walter J. Hamlin Professor of Dermatology; John A. Rogers, PhD, the Louis Simpson and Kimberly Querrey Professor of Materials Science and Engineering, Biomedical Engineering and Neurological Surgery; and Milan Mrksich, PhD, Northwestern’s former vice president for research.

“By collaborating across universities, we have assembled an absolute ‘dream team’ of researchers with unmatched scientific skills and talent that enabled us to compete at the highest levels. The hub will be known as a place where discoveries are made and fields are transformed — and it will better position Chicago as an environment for life science translation and entrepreneurship,” Mrksich said.

The tremendous strength that Northwestern, the University of Chicago, and the University of Illinois Urbana-Champaign

“The Chicago Biohub will create technologies that will transform our understanding of tissue-scale biology, revealing important information about the processes that take place in living tissues that could lead to new therapies.”

Mark Zuckerberg,
CZI co-founder and co-CEO

have across the life sciences, physical sciences, engineering, medicine, and beyond will also accelerate breakthroughs and innovation, according to Kelley.

“One of the overarching philosophies that we have really driving how we’re putting the Biohub together is that we’re going to be empowering scientists and engineers to pursue their riskiest, most exciting ideas and really propelling high-risk, high-reward ideas forward to enable a new set of breakthroughs in biomedical research,” Kelley said during a virtual town hall in May that highlighted the mission, structure, and goals of the CZ Biohub Chicago.

A BETTER UNDERSTANDING OF INFLAMMATION

A main pillar of CZ Biohub Chicago is collaborative, cutting-edge research, specifically developing instrumented tissues and using novel engineering approaches to study inflammation and immune cell function in unprecedented detail and resolution. This research could reveal how disruptions in these processes lead to inflammation and disease.

“At the CZ Biohub Chicago, we will learn how to bias inflammation up and down by measuring spatiotemporal cellular responses at the molecular level in 3D living tissue,” Kelley said.

Chronic inflammatory diseases are one of the leading causes of death worldwide. More than half of all deaths are attributable to inflammation-related diseases, including autoimmune diseases, metabolic diseases such as diabetes, and cancer.

Using new technologies, investigators at CZ Biohub Chicago will aim to characterize the molecular and cellular regulators of tissue inflammation to better understand why these changes occur and how they lead to metabolic and immunologic changes. This, in turn, could ultimately lead to new targeted therapeutic interventions and more robust disease prevention strategies.

The Biohub will also work with CZI teams, including the CZI science technology team, to develop technologies that understand, observe, measure, and analyze any biological process within the human body across spatial scales and in real time.

“The Chicago Biohub will create technologies that will transform our understanding of tissue-scale biology, revealing important information about the processes that take place in living tissues that could lead to new therapies,” said CZI co-founder and co-CEO Mark Zuckerberg. “This immense scientific challenge requires bringing together researchers and technologists in new ways to accomplish great science that isn’t done in conventional environments.”

CREATING SYNERGY ACROSS UNIVERSITIES

In addition to multidisciplinary research, the CZ Biohub Chicago will also lead a host of extramural programming, including an acceleration program, a visiting faculty and fellowship program, and an investigator program. These programs will link investigators at the Biohub directly with investigators at Northwestern, the University of Chicago, and the University of Illinois Urbana-Champaign.

“With a great deal of synergy, we want people at the universities working closely with people at the Biohub and vice versa,” Kelley said during a biomedical science panel held in the Hughes Auditorium in May for Northwestern’s presidential inauguration week. “We want people from the university coming to the Biohub, we want people at the Biohub going to the universities and really facilitating cross-fertilization of ideas and technologies. My hope, and a big part of my job, is making sure that it is very collaborative, and we keep the partnerships very strong.”



LEFT — Shana Kelley, PhD, (lower left) will lead Chan Zuckerberg Biohub Chicago. RIGHT — Feinberg investigators convened at “The New Frontiers of Biomedical Science and Biomedical Engineering” panel in the Hughes Auditorium on May 30 during Northwestern’s presidential inauguration week. From left to right: Douglas Vaughan, MD; Shana Kelley, PhD; Eric G. Neilson, MD; Abel Kho, MD; Guillermo Ameier, ScD; and John Rogers, PhD. Photo by Jasmin Shah.



The Path Back to Feinberg

By MAAB President Nupur Ghoshal, '01 PhD, '03 MD

I am honored and humbled to be the incoming president of the Medical Alumni Association Board (MAAB). I have watched as my predecessors, Rishi Reddy, MD, and Ed Kim, MD, MBA, ushered us through and out of the COVID years. I am pleased to pick up the baton and run with it — and to bring you all along for the ride.

My connection to Feinberg has been a long and winding one. I entered with the Class of 1999 as an MSTP student. While my colleagues graduated in 1999, I was in the lab working on my PhD. After completing my PhD in 2001, I graduated with the Class of 2003. After eight years, I left Feinberg for Washington University in St. Louis (where I now serve as associate professor of Neurology and Psychiatry) and did not return to campus until 2008. I missed the place dearly but had no sense of connection. Was I the Class of 1999? 2003? 2001?

“There is a lost generation of alumni among us. They continue to bleed purple and recall their days at Feinberg fondly. I challenge you all to seek them out. Get them to connect. Help them find their footing. Get them to show up and engage.”

Fast forward to an alumni event held near the WashU campus. I learned from ML Farrell, then director of Alumni Engagement, of the MAAB's newly invigorated mission to broaden its membership geographically. It turns out that St. Louis has many Northwestern grads. In Neurology alone, the associate director of our Alzheimer Disease Research Center, former program director of the residency program, former vice chair, and former chair are all Northwestern alums.

I connected. I was brought into the MAAB after a discussion with then-president Jim Kelly. I came to MAAB meetings for a while but was still looking for my niche. My first project was the alumni Facebook page rebrand, which resulted in a 329 percent increase in traffic.

But it was the 2017 Women in Medicine (WIM) Tea at the Drake that really solidified the role I would play.

I was captivated by the stories alumnae spanning many eras shared at the tea. That year, I turned to Babette Henderson, senior director of Alumni Engagement, and suggested we take inspiration from this event and move forward. That inspiration happily coincided with the MAAB's plan to pursue a strategic initiative in the women in medicine space. I took on the challenge and helped launch a WIM Facebook page to provide a forum to continue relevant conversations online.

There were also WIM networking events at the Museum of Contemporary Art. To fit one such event into my schedule, I once taught at WashU in the morning, flew into Chicago later that day, attended the function, and flew back the next day. Perhaps this was extreme, but my

“I encourage you to pay it forward and help current Feinberg students advance in their careers as we have.”

thought was, if WIM was my niche, then I needed to show up.

I share my story to highlight that there is a lost generation of alumni among us. They continue to bleed purple and recall their days at Feinberg fondly. I challenge you all to seek them out. Get them to connect. Help them find their footing. Get them to show up and engage.

These are exciting times for Feinberg. We continue to rank highly among peer institutions, and the dream of a tuition-free medical school remains the goal. But in the meantime, I encourage you to pay it forward and help current Feinberg students advance in their careers as we have. In the WIM space we have the Mary Ann Frable, MD Dean's Scholarship for Women in Medicine. In the Inclusion and Allyship space, we have the Promise Scholarship.

Finally, there is no better way to connect than to attend Alumni Weekend 2023 (Oct 13-14). See for yourself all the changes and advancements that have been made at Feinberg. I hope you, too, can find your footing and engage in as many ways as possible.

Charlotte S. Yeh, '71 BS, '75 MD, chief medical officer at AARP Services, Inc., has carved out a unique career path from the emergency department to consumer-oriented wellness.

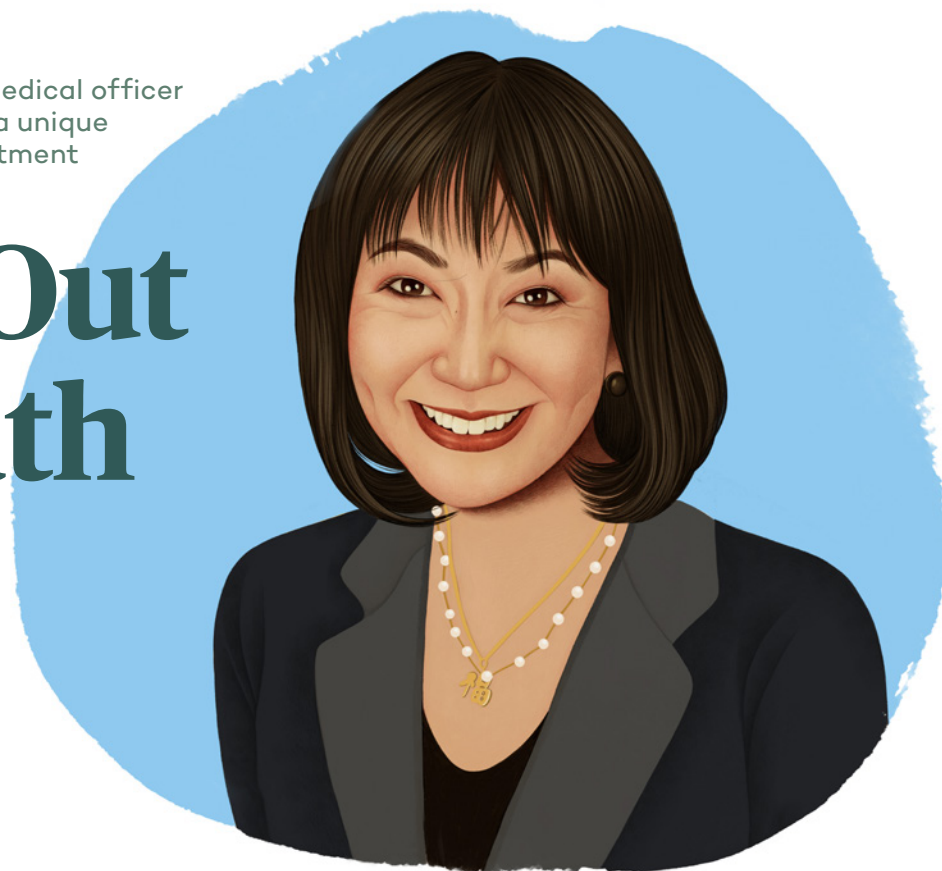
Carving Out a New Path

Charlotte S. Yeh, '71 BS, '75 MD, spent her first day as a surgical intern at the University of Washington in Seattle working in a community emergency department. That initial trial by fire introduced her to the specialty she would fall in love with and practice for three decades.

"You could create order out of chaos," she says. "People came in scared, frightened, and you had a chance to make a difference in their lives."

Each time she rotated through the emergency department during her two years of surgical residency, she found herself beaming from ear to ear, so she decided to change her career trajectory. But the change wouldn't be so straightforward. Emergency medicine would not become an officially recognized specialty until 1979.

Yeh had to create her own path — something she has done time and time again over her five-decade-long career. She has gone from being among the first cohorts of emergency residents in the country to a leader and advocate in the field. Not content to stop there, she has plunged into the world of policymakers and payors to expand her impact on patient care, and, more recently, she has worked to empower older adults to live healthy, fulfilling lives.



CHANGE AGENT

Yeh decided to become a physician at age 5 after a close friend required tonsillitis treatment. Few women were in the field then, but she found a role model in a family friend who was a physician-scientist. Yeh planned to follow in the woman's footsteps, but she discovered that she enjoyed hands-on clinical care through Northwestern's Honors Program in Medicine and shifted her focus "from test tubes to people."

"Thank goodness for Northwestern," she says. She credited the strong clinical training at Northwestern for giving her the confidence to know she was doing right by her patients even under high pressure situations in the emergency department.

During her surgical residency at the University of Washington, she witnessed the profound impact of Seattle's early investment

in training the public in cardiopulmonary resuscitation (CPR) and deploying emergency medical services. She remembers a person who had a cardiac arrest just outside city limits and was kept alive by a bystander conducting CPR. They were stabilized and transported to the hospital by paramedics, then walked out of the hospital after receiving care.

"The emergency department is such a barometer of what works and what does not in healthcare and the community," she says. Her experiences in Seattle solidified her decision to work in the emergency department despite criticism from some individuals that she was "throwing her career away." She transferred to the general surgery program at the University of California, Los Angeles (UCLA). Soon after, UCLA created

CAREER HIGHLIGHTS

1975

Earned a BS/MD from Northwestern's Honors Program in Medicine

1975

Started a surgical internship at the University of Washington in Seattle

1976

Transferred to the surgical residency program at the University of California, Los Angeles (UCLA)

1978-1980

Completed Emergency Medicine residency at UCLA

1980-1982

Joined the faculty at Newton-Wellesley Hospital as associate director of the Department of Emergency Medicine

1982-1984

Became acting director of the Department of Emergency Medicine Newton-Wellesley Hospital

1985-1990

Led mandatory seatbelt legislation efforts as a member of the board of directors of the Massachusetts Seat Belt Coalition

an emergency department residency program, and Yeh became part of its inaugural class.

“There is no greater high than when you are successful at caring for someone in the emergency department and no lower low than when you are not,” she says.

In 1980, Yeh joined the faculty at Newton-Wellesley Hospital, a community hospital on the outskirts of Boston, where she helped create the first emergency department to provide 24/7 emergency medicine residency-trained attending physicians. She served as emergency department chief from 1986 to 1994. She also helped create the first full academic department of emergency medicine in Boston and the first to provide 24/7 full-time emergency medicine-trained attending supervision in an academic medical center in Boston at Tufts Medical Center. She served as the department’s physician-in-chief for eight years, from 1990 to 1998.

Throughout her career, she witnessed some of the holes in the safety net that emergency departments provide for their communities. She remembers vividly a woman bleeding profusely in the lobby of one emergency department where Yeh worked before moving to Massachusetts. Registration staff wanted to send the woman by ambulance two hours away to the county hospital because she could not pay. Instead, Yeh insisted on providing immediate care, because no one should be turned away because of an inability to pay.

“When you see people and hear their stories, it inspires you to advocate for change,” she says.

She became involved with advocacy at the American College of Emergency Physicians (ACEP), where she helped advocate for the passage of the Emergency Medical Treatment and Active Labor Act (EMTALA). The federal law enacted in 1986 requires hospitals to provide lifesaving emergency care regardless of the patient’s ability to pay. She was the third woman to serve on the ACEP’s Board of

Directors and was the organization’s vice president from 1992 to 1993.

She served on the Board of Directors of the Massachusetts Seat Belt Coalition from 1985 to 1990 and advocated for laws requiring seat belts and provided testimony on the tremendous difference they make for people involved in car accidents. Though her testimony often brought policymakers to tears, it did not change policy. It was not until she started including information on the costs of treating individuals who were not wearing safety belts that she saw the needle move.

“It is not enough to tell the story,” she says. “We have to show it is costing us money if we do not.”

Though she loved the three decades she worked in emergency departments, she began to feel she could make a bigger impact elsewhere. “I was just catching people as they fell through the cracks,” she says. “I needed to go upstream.”

POLICY PIVOT

The systems-level thinking, calm, and patience Yeh developed in the emergency department proved to be assets as she pivoted her career into the world of policy full-time. She started as medical director of Medicare Policy for the National Heritage Insurance Company, a contractor processing Medicare part B claims, in 1999. She then served as regional administrator at the Centers for Medicare and Medicaid Services (CMS) in Boston from 2003 through 2008. In that role, she helped promote Medicare’s newly created Part D prescription drug coverage to seniors.

She also took on other leadership roles, serving on the American Hospital Association’s board from 2002 to 2003 and the Blue Cross Blue Shield of Massachusetts Foundation Board from 2001 to 2018. Her work in Massachusetts in the early 2000s gave her a front-row seat to the state’s efforts to expand health insurance coverage, which eventually provided the

blueprint for the Affordable Care Act. As CMS regional administrator, she supported the waiver to allow the program to proceed.

“It was nice to be one little piece in all the people that worked on that,” she says.

Since 2008, she has been the chief medical officer of AARP Services, Inc., which helps develop products and services for older adults — a role that has allowed her to focus on consumer advocacy.

“It is about going back to my roots and helping people live their best lives and stay healthy,” she says. But instead of helping one person at a time, she is working to help the more than 100 million Americans who are 50 and older, and their families, she says.

She has shifted her focus to solving “upstream” problems with the hope of preventing people from ever needing to visit the emergency department. For example, she’s worked on initiatives helping older people, their families, and caregivers navigate the health system that reduced hospitalizations and associated costs. Her work at AARP has gained her national recognition, including as one of Modern Healthcare’s 50 Most Influential Healthcare Executives in 2021. She also serves on the Dementia Discovery Fund Scientific Advisory Board, the Personal Connected Health Alliance Board of Managers, the Board of Directors for The Schwartz Center for Compassionate Care, and the Board of Directors for the Coalition to Transform Advanced Care.

Her current focus at AARP is helping older adults reduce social isolation and loneliness and help them find a renewed sense of purpose, which she noted are all keys to staying healthy. Her own battle to recover and relearn how to walk after being hit by a car a few years ago has made her even more passionate about her work. Since the accident, she has learned to ski and has taken up biking, boxing, and scuba diving.

“I have learned a lot of new things to keep me busy, active, and making the most of my life,” she says. ♦

1986-1994

Served as Chief of Emergency Medicine at Newton-Wellesley Hospital

1987

Served as president of the Massachusetts Chapter of the American College of Emergency Physicians

1988-1994

Became the third woman to serve on the American College of Emergency Physicians Board of Directors

1990-1998

Headed the Department of Emergency Medicine at Tufts University Medical Center

1992-1993

Served as vice president of the American College of Emergency Physicians

2001-2018

Served on the board of the Blue Cross Blue Shield of Massachusetts Foundation

2002-2003

Oversaw the American Hospital Association as a member of its board

2003-2008

Led the regional office of the Centers for Medicare and Medicaid in Boston

2008-PRESENT

Oversees quality control for health products and services for AARP Services, Inc. as Chief Medical Officer

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.

1960s

Robert Kotler, '67 MD, clinical instructor in the Department of Head and Neck Surgery at University of California, Los Angeles, wrote in recently with a memory from his medical school days: "As a senior, I was on assignment at the Chicago Maternity Center. At the time, home obstetrics service was staffed by Northwestern University Medical School. For two weeks, we would live in an apartment building; two students or a student and RN would be on call to deliver a baby when called by a community resident who had chosen not to deliver in a hospital. I knew my father was born in that neighborhood and delivered at home. My grandparents were very poor immigrants and, as many did, utilized the Chicago Maternity Center. I asked the handyman if there were records dating back to 1916, the year of my father's birth. 'We certainly do,' he answered. I asked to see the logbook. Down to the basement we went and, sure enough, we quickly found the October 3, 1916,



On March 9 in New York, faculty members **Clyde W. Yancy, MD, MSc**, (left) and **Douglas E. Vaughan, MD**, (right) joined **Emily J. Rogalski, '07 PhD**, and **Francesca Elizabeth Duncan, PhD**, at a dynamic presentation, hosted by Feinberg, that tackled questions about aging and longevity as part of Northwestern Alumni Association (NAA)'s "A Night With Northwestern" series.

entry. The family last name was misspelled, but who cares? If only I'd had an iPhone!"

Trent William Nichols, Jr., '69 MD, '76 GMER, '78 GMEF, recently published "Medical Hypothesis: Reconceptualizing Alzheimer's Disease as Quantum Decoherence Resulting from Mitochondrial and Microtubular Deterioration," with Jack Tuszyński, PhD, professor of Physics at the University of Alberta, and Marvin H. Berman, PhD, chief executive officer of the Quietmind Foundation, in the *Journal of Multiscale*

Neuroscience (Neural Press). They also have applied for a third U.S. patent: Photobiomodulation using Near Infrared (NIR) Light in Alzheimer's, Parkinson's, other Dementias and Memory Loss Disorders along with Neuronic Limited, after achieving statistical significance in several placebo-controlled clinical trials in early to mid-Alzheimer's and Parkinson's dementia using NIR transcranially after two months of BID-wearing for seven minutes. Nichols has served as chief medical officer for ICARE Foundation for the past three years and now as chief medical officer of Quietmind Foundation. 📷 1

1970s

Bruce F. Scharschmidt, '68, '70 MD, former Medical Alumni Association (MAA) Board president, recently published another children's book. Released on April 22, the book is titled *Tina the First Tooth Fairy*. The book offers a unique reimagining of the tale children know and love, as described in the promotional materials: "A shortage of fairy dust has the fairy community anxiously scratching their heads. How will they carry on when they run out of dust? Empowered by the support of her big sister, Tiny Tina sets off on a mission to find a sustainable source and discovers it in the most unlikely of places—baby teeth!" Scharschmidt previously served as professor of Medicine and chief of Gastroenterology at the University of California, San Francisco (UCSF), where he helped start the UCSF liver transplant program. He has authored over 200 scientific papers and book chapters and served as editor-in-chief of the *Journal of Clinical Investigation* and president of the American Society for Clinical Investigation. He also served on the National Board of Directors of the American Liver Foundation and participated in the development of multiple vaccines and therapeutics. *Tina the First Tooth Fairy* is available for purchase on Amazon. 📖 2

Leo A. Gordon, '73 MD, gave an animated reading at the inaugural meeting of the Cedars-Sinai Medical Center for Humanities in Medicine. His essay, "Out of Touch," is a

bittersweet assessment of progress in surgery as human disease has moved further and further from his hands by way of laparoscopy and robotics. To read "Out of Touch," visit the *General Surgery News* publication website. 📖 3

Jerome Craig Cohen, '79 MD, '82 GME, became president-elect of the Medical Society of the State of New York (MSSNY) on April 23. Cohen previously served as vice president of MSSNY as well as other leadership roles. Cohen is board-certified in both internal medicine and gastroenterology. He is also a Fellow of the American College of Physicians and a Fellow of the American Gastroenterological Association. Cohen treated patients in Binghamton from 1984 to 2015. Since 2015, he has been treating patients in Cooperstown for Bassett Healthcare Network, where he serves as a senior attending gastroenterologist. Cohen is also clinical assistant professor of Medicine at the Cooperstown campus of Columbia University Vagelos College of Physicians and Surgeons. Cohen and his wife Elaine V. Drelich, DDS, live in Loch Sheldrake, New York.

1980s

Charles S. Modlin, '83, '87 MD, was recently interviewed on Fox 8 News Cleveland for his work on the MetroHealth Minority Men's Health Fair. The Health Fair featured over 30 free health screenings for men. As reported by Fox 8 News,

BRUCE F. SCHARSCHMIDT, '68, '70 MD, FORMER MEDICAL ALUMNI ASSOCIATION (MAA) BOARD PRESIDENT, RECENTLY PUBLISHED ANOTHER CHILDREN'S BOOK. RELEASED ON APRIL 22, THE BOOK IS TITLED *TINA THE FIRST TOOTH FAIRY*.

Dr. Modlin founded the event over 20 years ago and is passionate about helping men take control of their health by finding concerns early and getting treatment. For more information visit metrohealth.org/mmhf

Steven J. Price, '84, '86 MD, '91 GMER, was recently appointed to the board of trustees of ThedaCare. Price is founder and managing partner of the Neuroscience Group, an independent practice working closely with ThedaCare. Composed of 17 physicians and surgeons and a total of 48 providers, Neuroscience Group is currently seeking more neurologists. To be connected with the Neuroscience Group, please email the MAA. Price also is an active member of the American Academy of Neurology and the National Headache Foundation.

Steven R. Deitcher, '86, '88 MD, will be featured in *Top 100 Innovators & Entrepreneurs* magazine. As founder, chief executive officer, and chair of





Bespoke Biotherapeutics, a B-cell bioengineering company, Deitcher's work in finding solutions for solid-tumor cancers is supported by 14 granted and several pending patents. "Our goal is to dramatically improve patient outcomes and reduce the side effects of anti-cancer therapies," he shared. 📷 4

Anita K. Lane, '87 MD, '94 GME, has been announced as an alumni recipient of the Joliet Catholic Academy's 2023 Hall of Champions: Business and Industry. The mission of the Hall of Champions: Business and Industry is to honor graduates for their accomplishments throughout their professional careers ranging from medicine, law, education, entertainment, business, technology, and more. Lane is the owner and co-founder of Touchstone Internal Medicine in Colorado Springs, Colorado. 📷 5

1990s

Gaurov Dayal, '96 MD, was appointed to the board of directors of MDVIP, the market leader in personalized healthcare with a network of more than 1,100 primary care physicians nationwide. He is chief executive officer of Axia Women's Health. Dayal previously served as president and chief operating officer at Everside Health, president of new markets and chief growth officer at ChenMed, senior vice president at Lumeris, and the first chief medical officer and president of healthcare delivery, finance, and integration at SSM Health Care. 📷 6

Lucy A. Godley, '97 MD, PhD, has been named the inaugural director of the Jeff and Marianne Silver Family Blood Cancer Institute of the Robert H. Lurie Comprehensive Cancer Center, effective April 1. She also will serve as clinical director of Cancer Genetics. Made possible by a philanthropic investment from the Jeffrey and Marianne Silver Family Foundation,

the Silver Family Blood Cancer Institute of the Lurie Cancer Center was established to strengthen and expand emerging research and clinical trials in the Lurie Cancer Center's Hematologic Malignancies Program.

A nationally recognized expert in the treatment of patients with leukemia and myelodysplastic syndromes, Godley is currently professor of Medicine in the Section of Hematology and Oncology at Northwestern and professor of Human Genetics at the University of Chicago.

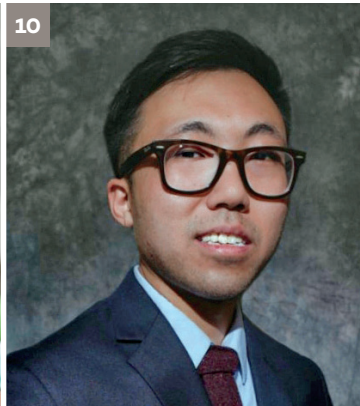
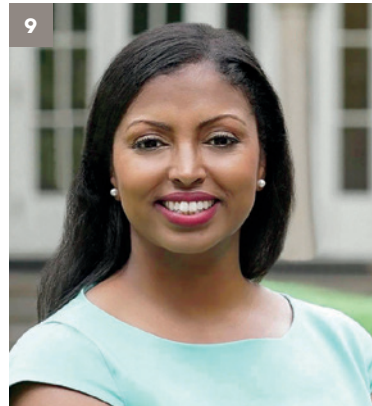
2000s

Amish M. Shah, '97, '01 MD, has announced he is running for U.S. Congress. Shah is an accomplished educator, consultant, and physician. He previously taught medical students and residents at the Mount Sinai Medical Center in New York as a full-time faculty member and academic researcher and led the New York Jets Airway Management Team. He worked with the National Football League (NFL) to improve their emergency management through research over a concern for potentially catastrophic injuries, later presenting his work at the NFL Physicians' Society. Shah has served as a member of the Arizona House of Representatives since 2019. 📷 7

2010s

Kathryn Hufmeyer, '11 MD, '14 GME, rejoined the medical school and Feinberg faculty as associate dean for Curriculum and associate professor of Medicine in the Division of General Internal Medicine. Hufmeyer is the prior recipient of Feinberg's Augusta Webster Faculty Fellowship in Educational Research and Innovation, the John X Thomas, Jr. Best Teachers of Feinberg Award, and the Excellence in Teaching Award. 📷 8

LINDA SULEIMAN, MD, '17 GME, WAS PROMOTED TO ASSOCIATE DEAN FOR DIVERSITY, EQUITY, AND INCLUSION AT FEINBERG.



Linda Suleiman, MD, '17 GME, was promoted to associate dean for Diversity, Equity, and Inclusion at Feinberg. Suleiman also is assistant professor of Orthopaedic Surgery and of Medical Education and director of Diversity and Inclusion at McGaw Medical Center of Northwestern University. Prior to the promotion, she served as assistant dean of Medical Education. 📷 9

2020s

Guangyu (Anthony) Bai, '20 MD, was recently awarded best presentation by a resident/fellow at the University of Wisconsin—Madison Emergency Medicine Research Forum. Bai's award-winning presentation was titled "Implementation of Mobility Assessment into Electronic Medical Record and Emergency Department Discharge Process Alters Disposition for Traumatically Injured Patients." 📷 10

PT

Emily Finn, '14 DPT, was recently honored by the American Physical Therapy Association (APTA) Section on Pelvic Health for being a 2022 Emerging Leader. This award recognizes an individual in their respective section of the APTA who has demonstrated extraordinary service in their early physical therapy career. 📷 11

NORTHWESTERN UNIVERSITY FEINBERG SCHOOL OF MEDICINE

ALUMNI WEEKEND 2023 | FRIDAY, OCTOBER 13 | SATURDAY, OCTOBER 14

Celebrate
IN CHICAGO



Fall back to campus

REGISTER TODAY: feinberg.northwestern.edu/alumni/alumni-weekend



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 passed away.

ALUMNI

Lawrence F. Turnbull,
'46 MD
December 7
SEATTLE, WA

Joan Bleiceffer, '50 BSDH
December 15
DES PLAINES, IL

Weldon J. Cooke, '52 MD
December 7
LA PORTE, IN

Harry L. Gibson, '59 MD
January 4
FULLERTON, CA

John D. Slaney, '62 MD
December 23
REDLANDS, CA

Allen I. Arieff, '64 MD
November 5
SAN FRANCISCO, CA

Thomas S. Stevens, '66 MD
December 26
MADISON, WI

D. Terry Esslinger, '69 DDS
December 8
CLOVERDALE, CA

James E. Appelwick, '71 MD
December 1
SHAWNEE, KS

Charles Thomas McHugh,
'71 GME
December 14
BAILEYVILLE, IL

Earl E. Martin, '73 DDS
January 6
ORION, IL

Jonathan R. Merrill, '73 MD,
'76 GME
December 14
HARTWELL, GA

Mark Greenberg, '76 MD
December 4
Palm Beach GARDENS, FL

Michael E. Fichera,
'77 DDS
January 11
BOXFORD, MA

William G. Spies, '75 BSM,
'77 MD, '80 GME
November 15
SKOKIE, IL

Marc Stanton Elias,
'19 GME
December 9
CHICAGO, IL

FACULTY



Arthur Veis, PhD, professor emeritus,
Cell and Developmental Biology
April 24
EVANSTON, IL

Arthur Veis, '51 PhD, professor emeritus, died on Sunday, April 24, 2023. He was born in 1925, served in the U.S. Navy in WWII and enrolled in the Department of Chemistry at Northwestern University, where he earned a PhD with Irving Klotz. He was actively engaged in science until very recently. Veis, known as "Art" by his colleagues, is widely recognized for his scientific achievements in several disciplines. His first major contributions were in elucidating the molecular structure of Type I collagen fibrils. In recent years he turned his interests to the topic of biomineralization, a field he helped create. He was never afraid to try new techniques and approaches. These often produced remarkable insights still cited in the literature. As one colleague said, "Art stood head and shoulders above his contemporaries, typically those with loud voices and sharp elbows." In addition to his formidable abilities as an investigator and organizer, Veis was always a very welcoming, supportive, and positive person. He was an active mentor, having educated many PhD students and post-docs. At his 90th birthday party in 2015, dozens of former colleagues traveled to celebrate with him and many, many more from abroad sent warm greetings.

This tribute was written by Veis's colleagues in the Department of Cell and Developmental Biology Stuart Stock, PhD, and Alvin Telser, PhD.

Donors, Friends Support Brain Tumor Research at 15th Annual Minds Matter Benefit

More than 300 friends and philanthropists gathered May 5 to celebrate and support advancements in brain tumor research and care, raising more than \$500,000.

The Minds Matter benefit, held this year at the Ritz-Carlton in Chicago, is an annual fundraiser for the Lou and Jean Malnati Brain Tumor Institute (MBTI) of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University at Northwestern Memorial Hospital. Net proceeds support brain tumor research and patient care.

More than 700,000 people living today — and their families — face the challenging realities of a brain or spinal diagnosis. This year, the Northwestern Medicine team tested a novel, skull-implantable ultrasound device to open the blood-brain barrier and deliver chemotherapy that directly targets the aggressive tumors associated with glioblastoma. They also developed a new tool to help physicians predict the risk of blood clots in patients with adult-type diffuse gliomas and discovered a combination of treatments that extend progression-free survival in patients with recurrent glioblastoma.

“Once again, the annual Minds Matter benefit united our community of donors, patients, and champions of the Malnati Brain Tumor Institute to support our mission of improving treatments and outcomes for brain and spine tumor patients in Chicago and beyond. We are deeply grateful for the opportunity to celebrate our successes as well as plan for a bright future,” said James P. Chandler, MD, co-director of MBTI

and the Lavin/Fates Professor of Neurological Surgery.

“Raising funds for brain tumor research is personal to me,” said Bill Evanoff, a member of the MBTI Advisory Council and chair of the Minds Matter host committee. “So many lives have been forever altered by this disease. But like so many others who have been impacted, I’ve also found true hope from the treatment innovations and research advancements made at the MBTI.”

Still, Evanoff said, there is much more that must be done to keep the momentum going. “Coming together year after year to fund brain tumor research — in addition to providing a wonderful, inspiring evening — is incredibly impactful on countless lives,” he said.

“Like so many others who have been impacted, I’ve also found true hope from the treatment innovations and research advancements made at the MBTI.”

BILL EVANOFF



Bill and Viviane Evanoff, members of the MBTI Advisory Council. Right: Dean Harrison, executive chairman of Northwestern Memorial HealthCare; Jeanne and Marc Malnati; Jean Malnati-Miller (front); Amy Heimberger, co-director of the MBTI; Roger Stupp, co-director of the MBTI; and James P. Chandler, co-director of MBTI.

EMBRACING HISTORY, ON CAMPUS AND BEYOND

A native of San Antonio, Texas, Joseph Gugenheim Jr., '72 MD, had never been to Chicago until he got accepted to Northwestern University's medical school (nicknamed "NUMS" by many alumni before it became Feinberg).

"I was accepted to several medical schools, but what convinced me to choose NUMS was when my interviewer told me, 'If you are good enough to get in, we feel you are good enough to graduate,'" said Gugenheim. "This attitude was so different from the dog-eat-dog atmosphere at other schools."

In addition to Northwestern's spirit of comradery, Gugenheim quickly fell in love with Chicago—a relationship that has not waned

For us to succeed in meeting their needs, we need to listen, really listen, to young people.

since his graduation some 50 years ago. Along with his wife, Terri, he regularly returns for Alumni Weekend, where for the past several years, Gugenheim, a self-

described amateur Chicago historian, has given walking tours to attendees. At this October's reunion, he will host another set of tours. In preparation, we decided to ask the historian to share his own history.

Why did you choose to go into medicine and specialize in orthopedics?

I was attracted to medicine because of my love of science and my desire to help people. In college at Rice University, I knew I wanted to get fulfillment by straightening whatever was crooked. I had an orthopedic rotation at Northwestern and noticed the orthopedic residents appeared to be having fun. I chose the right field. Eight years into practicing, a radical new method of bone reconstruction came to the U.S. from Europe, giving physicians

the ability to correct complex deformities and salvage bones that would have resulted in amputations or severe permanent disabilities only a few years earlier.

How did you take advantage of living in Chicago while you were a student?

We formed groups that would run to Lincoln Park or Grant Park. I bought a 10-speed bike (considered advanced at the time!) and would go for relaxing Sunday rides through the northern suburbs. I also visited museums whenever I had the opportunity.

Why is the surrounding environment so important when you are attending medical school?

If a med school is located in a city or in a neighborhood that offers no cultural or extracurricular activities, students will not develop a love for the nonmedical aspects of life.

What came first: your interest in Chicago history or Northwestern history?

I was interested in the history of Chicago from the beginning. I then became interested in the history of the Chicago campus—curious about these Gothic buildings in a downtown professional school campus. I later became interested in the history of the entire university.

What can physicians learn from what you've learned about teens?

Teens deserve to be heard. Parents and teens look to us as physicians for guidance and leadership about health-related issues and answers to health questions. For us to succeed in meeting their needs, we need to listen, really listen, to young people.



What are you exploring at the moment?

The history of epidemics in Chicago, especially polio. I was a child before the Salk vaccine became available, and we dreaded every summer when polio would become rampant. Chicago has encountered several epidemics: smallpox, cholera, and the 1918 influenza epidemic. The fear and misinformation that circulated with these epidemics repeated itself in many ways with COVID.

Leave us with a few facts about Feinberg.

I will focus on Abbott Hall, since some alumni lived there. Named for Dr. Wallace Calvin Abbott and his wife, Clara—who both died years before it opened in 1940—it was the tallest dormitory in the world at the time. President Kennedy lived there during his early days in the U.S. Navy. Abbott made a fortune in the drug industry, but his real love was practicing medicine, leaving the operation of Abbott Laboratories to others while he made house calls on his bicycle.



1902

Memento Mori

CELEBRATING THE LIFE AND WORK OF SURGEON CHRISTIAN FENGER

Top Left: Parts of the Carl Zeiss photomicrographic microscope.

Bottom-Left: Late 19th-century post-mortem dissection kit housed in a fitted wood case containing 25 instruments, including a bone saw, hammer, heavy bone chisel, scissors, scalpels, tweezers, tissue retracting chains with hooks, and more.

Center: Plaster death mask of Christian Fenger sculpted by Clio Hinton Bracken in 1902.

Right: Carl Zeiss photomicrographic microscope with rotating three objective lens, coarse and fine tuning, circular rotating stage, jug handle, and horseshoe base engraved "Ph," which identifies the microscope as the photomicrographic model. Circa 1899.

Christian Fenger grew up in Denmark as the son of a farmer, but Fenger wasn't content to take on his father's calling. Instead, he studied medicine at the University of Copenhagen in the 1860s, when he was called to serve as a surgeon during the Danish war with Prussia. He eventually received his diploma and gained a reputation as an innovator for inventing instruments to locate and extract bullets.

But when he was passed over for a professor of pathology appointment, he sought opportunities outside his home country. He practiced medicine in Egypt before being persuaded by a friend to move to Chicago in 1877. There, he served as the chief pathologist at the County Hospital until 1893, when he became a professor of surgery at Northwestern.

His knowledge of pathology and anatomy garnered him the reputation of one of the great surgeons of his time. He conducted thousands of post-mortem examinations and brought new procedures to the Midwest; he was said to have conducted the first hysterectomy in Chicago.

"It may be said that Fenger laid the foundation in Chicago not only for the modern surgeon, but also for the modern internist through his teaching of systematic and thorough examinations, and to use these to properly interpret pathology," according to a biography written in 1913.

He was also known as an excellent teacher who trained numerous students and assistants and "frequently forgot the passage of time in the apparent joy of teaching," according to a 1922 publication written in his honor. Several of his students became prominent physicians, including brothers Charles Horace and William James Mayo, as well as Nicholas Senn and James B. Herrick. Today, Christian Fenger Academy High School in Chicago is named in his honor.

Upon his death in 1902, a plaster death mask of his face and head was created as a memento of his successful life. The mask, now part of the Galter Health Sciences Library and Learning Center's collection, is pictured here, along with surgery and pathology tools from the period in which Fenger worked.

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