

Northwestern Medicine

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SPRING 2019

EAR TO THE GROUND

**NORTHWESTERN INVESTIGATORS LISTEN
TO THE SCIENCE OF HEARING LOSS.**

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Learning From Each Other

RESEARCH DAY 2019

More than 450 scientists, trainees, students and faculty presented posters and abstracts at Feinberg's 15th Annual Lewis Landsberg Research Day — the largest celebration of scientific investigation at Feinberg to date.

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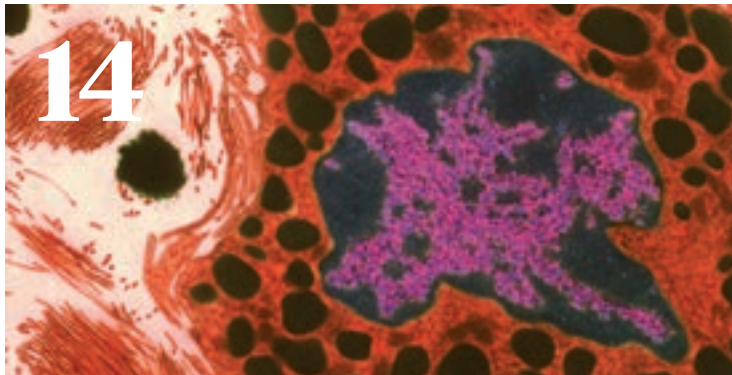
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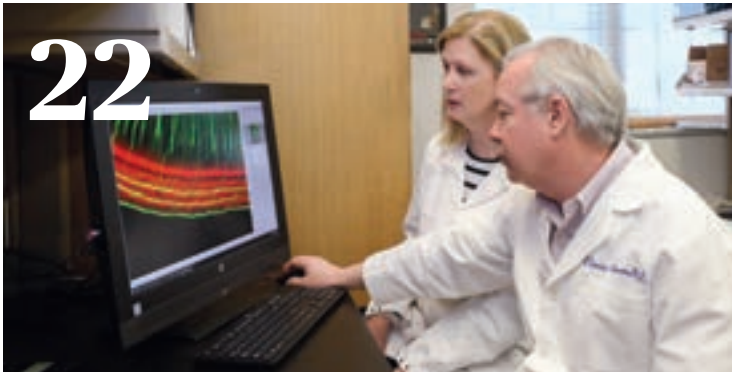
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ON THE COVER

A mutant ear lacking the INSM1 gene, in which about half of the outer hair cells have converted into inner hair cells. Image provided by the laboratory of Jaime García-Añoveros, PhD.

Becoming a Learning Organization



IN HIS 1990 BOOK “THE FIFTH DISCIPLINE: THE ART AND PRACTICE of the Learning Organization,” Peter Senge, PhD, a systems scientist and lecturer at MIT Sloan School of Management, describes a “learning organization” as a place “where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together.”

I was recently reminded of this notion during one of the most thought-provoking days of the year here on campus: our annual Lewis Landsberg Research Day, during which students, staff, faculty and trainees share the fruits of their labor throughout our research enterprise. Implicit in every poster on display is the goal of creating new knowledge, and using that knowledge to grow and develop — not just in individual careers, but within departments and centers, the institution overall, and across a variety of investigative interests. Aptly, one of the recent additions to Research Day is a special category and award for medical education research, which highlights evaluations of

new approaches to educating the next generation of medical students — right in line with the notion of championing a learning organization.

Our new curriculum, now entering its sixth year, is similarly rooted in research and iteration. We set ourselves apart from many medical schools by employing simulation-based Mastery Learning because our research shows that this approach improves providers’ skills and patient care, while reducing patient complications and health-care costs. In fact, simulation-based curricula developed at Northwestern Simulation for both adult and pediatric surgery have been disseminated throughout Chicago and the United States. Additionally, we offer students

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We engage in a process of continuous improvement and transformation — a mindset we believe will ultimately lead to improved health outcomes.

hands-on programs such as the Area of Scholarly Concentration (introducing students to scholarly research) and Education-Centered Medical Home (a unique longitudinal clinical experience).

What’s most noticeable, however, is that no one at Northwestern Medicine seems to be standing still. Our faculty, trainees and medical

students are all about creating new ideas. The lessons learned from these projects eventually feed back into our curriculum and the delivery of patient care, and help us engage in a process of continuous improvement and transformation — a mindset we believe will ultimately lead to improved health outcomes.

In this issue of *Northwestern Medicine*, one story in particular speaks directly to the importance of building upon earlier research. In the late 1990s, Jaime García-Añoveros, PhD, professor of Anesthesiology, Neurology and Physiology, and Anne Duggan, PhD, were doctoral candidates studying nerve cells in worms. Some 20 years later, the findings from that research led to new discoveries regarding the role of INSM1 in outer hair cell development in the ear, published in *Nature* in late 2018, providing new hope for the elusive goal of restoring hearing for the more than 36 million Americans suffering from varying degrees of deafness. This fascinating journey is explained in detail, starting on page 22. It reminds me of something that’s at the heart of what we believe at Feinberg: What you discover today — even if you set it aside to address other pursuits for a while — may fuel future understanding and accomplishment.

As Peter Senge writes in his book, a true learning organization continually searches for a better way. This shared spirit is on display every year at Research Day — and every day across our institution.

With warm regards,

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

ON CAMPUS

Feinberg Again Ranks Among the Best

OVERALL RANKING

19

in the nation among research-oriented medical schools

12

years in a row Feinberg has been in the top 20

SPECIALTY PROGRAMS

7

in the nation for obstetrics and gynecology

16

in the nation for internal medicine, pediatrics, radiology and psychiatry

17

in the nation for surgery



ENGAGING TEENS IN MEDICINE

Earlier this year, about 65 high school students — participants in the Northwestern Medicine Discovery program — watched Feinberg medical students dissect human cadavers and then asked questions about what it's like to study medicine.

“I enjoyed how the medical students were blunt, yet nice, when talking to us,” said Melissa Bueno, a student at Waukegan High School. During future weekend visits to Chicagoland hospitals, she and other teens will explore such specialties as pediatrics, emergency medicine and neurology.

The two-year program was designed to encourage students' interest in the medical field. Relying on physicians, residents and medical students to volunteer their time, it began at Northwestern Memorial Hospital and is now growing steadily, expanding across Northwestern Medicine's extensive network of hospitals in the Chicagoland area.

 More information about NM Discovery is available at nm.org


Northwestern University Feinberg School of Medicine was recognized as one of the best research-oriented medical schools in the nation, rising one spot to rank 19th, according to the latest *U.S. News & World Report* rankings.

This is the 12th year in a row Feinberg has placed in the top 20 of research-oriented medical schools, and this year, six of Feinberg's specialty programs were recognized among the best in the nation — an all-time high for nationally ranked specialties. Obstetrics and gynecology rose one spot to rank 7th in the nation while internal medicine, pediatrics, radiology and psychiatry all ranked 16th, and surgery ranked 17th.

UNCOVERING WHY DISEASES AFFECT WOMEN DIFFERENTLY

Scientists predominantly use male cells and animals when investigating diseases (even those prevalent in women), sometimes resulting in the development of drugs with serious side effects in women. To change this, and help investigators uncover why diseases affect women differently than men, in 2009, the Women's Health Research Institute at Northwestern University developed the Illinois Women's Health Registry (WHRI), linking women to studies throughout the state. A recent upgrade makes the registry mobile- and tablet-friendly, allowing users to easily fill out an annual survey about their health in about 30 minutes.

“Information will now be available to investigators at no cost so they can do major epidemiological and demographic studies of women,” said Marla Mendelson, MD, '87 GME, co-director of the WHRI and associate professor of Medicine in the Division of Cardiology and of Pediatrics.

 Women 18 and older can enroll online at <https://portal-enrollment.rexdb.com/women>

Live From Match Day 2019

On Friday, March 15, Kyle Fahey, a fourth-year medical student, stood with his classmates on the third floor of Gino's East in Chicago, clutching a life-changing white envelope. At the count of five, the students tore open their envelopes in unison. The room filled with cheers as the Class of 2019 learned where they will spend the next phase of their medical careers.

"I've never experienced anything like this. The energy is indescribable," said Fahey, who matched at Stanford University Medical Center in internal medicine. "This day is a culmination of four years of hard work, and everyone I've talked to is just so thrilled and happy."

On Match Day, the third Friday of March, all fourth-year students across the country learn — at exactly the same time — where they will train as residents for the next three to seven years. At Northwestern's Match Day, the class of 2019 high-fived and hugged each other, posed for pictures with their match letters, and raced to call family members and friends with the good news.

"I truly couldn't have ever expected to be this happy," said Roshni Bhatnagar, who learned she matched at UCLA Medical Center in internal medicine. "I couldn't imagine receiving this incredible news with anyone besides the people who got me here — my classmates, best friends and all the deans who have supported us."

Residency matches are made by the National Resident Matching Program (NRMP), which uses a computerized algorithm to pair graduating medical students with available training positions at U.S. teaching hospitals. The model takes into account the top choices of both the students and the residency programs. This year's match, the largest on record, included more than 44,600 registered applicants and more than 35,000 residency positions offered.

For Paula Lewis-de los Angeles, a student in the Medical Scientist Training Program (MSTP), Match Day was the result of seven years of MD/PhD studies. She is now headed to Brown University for a triple board program in pediatrics, psychiatry, and child and adolescent psychiatry.

Liz Nguyen and Alex Rodriguez entered the match as a couple. The two students, who met during their first year of medical school, are now headed to Stanford University Medical Center together.

to be doing, and taking care of patients in a meaningful way."

Nguyen, who matched in pediatrics, noted the support of their fellow classmates and Feinberg faculty. "There's nobody else who I would have rather gone through this whole process and the last four years with," Nguyen said. "The deans and the whole AWOME office — they are our best advocates and we really couldn't have done this without them."

For many, Match Day was a moment to not only celebrate their success as medical



The NRMP allows students who choose to match as a couple to link their rank lists together, in order for the two to obtain residencies in the same geographic location.

"We both ended up matching at our number one choice, so we're very excited," said Rodriguez, who is entering a combined program in internal medicine and anesthesiology. "We've worked for this moment for most of our lives and now all the hard work is paying off. I'm finally going to be doing what I'm meant

students, but to look forward to their first few years as physicians.

"It's exciting and surreal, but also motivating at the same time," said Martin Mutonga, who matched at Yale New Haven Hospital for interventional radiology. "This is a dream that started about 10 years ago for me, so I'm excited to see what the future holds."



172

students matched to medical facilities across the country

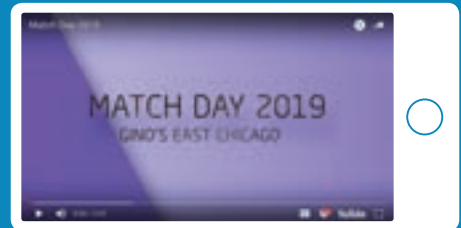
65%

of Feinberg students matched at top 25 U.S. News-ranked residency programs



FEEL THE MOMENT

To watch a video of Match Day, go to news.feinberg.northwestern.edu and type **MATCH DAY 2019** into the search box.



Medical Students' Discoveries

Feinberg students contribute to research in a variety of fields — and publish and present their discoveries on a national level.

Childhood Trauma's Effect on Cardiovascular Risk

Entering medical school, Jacob Pierce, a third-year student in Northwestern's MD/MPH Combined Degree Program, was interested in "investigating the intersection between social determinants of health and clinical medicine, and how I could impact both of those arenas as a physician."

As the first author of a study that helps provide new insights into the connection between Adverse Childhood Experiences (ACEs) and cardiovascular disease, he is well on his way.

Using a prospective cohort of more than 3,000 participants, Pierce found that **people exposed to the highest levels of childhood family environment adversity were more than 50 percent more likely to have a cardiovascular disease event** over a 30-year follow-up, even after controlling for other risk factors.

Pierce, who conducted the research under mentor Joseph Feinglass, PhD, research professor of Medicine in the Division of General Internal Medicine and Geriatrics and of Preventive Medicine, recently presented his findings at the annual American Heart Association Scientific Sessions in Chicago.

One of the big questions Pierce's research project has prompted is, "Okay, so now what?" he said. "We know that childhood trauma is associated with increased risk for cardiovascular disease — so now what can we do to prevent heart attacks and strokes from occurring?"

Cardiovascular disease is still the number one cause of mortality in the United States. As a physician, I hope to work on both the clinical and research aspects of cardiovascular disease prevention to try to move the needle on that statistic."



Local Food Environment and Heart Disease Risk

As an undergraduate student at Northwestern, third-year medical student Julie Kelman spent time in France learning about public health



as part of her minor in global health. Studying the determinants of health abroad morphed into an interest in public health at home. "I wanted to combine my desire to engage in public health alongside my fascination with the pathophysiology of the heart," she said.

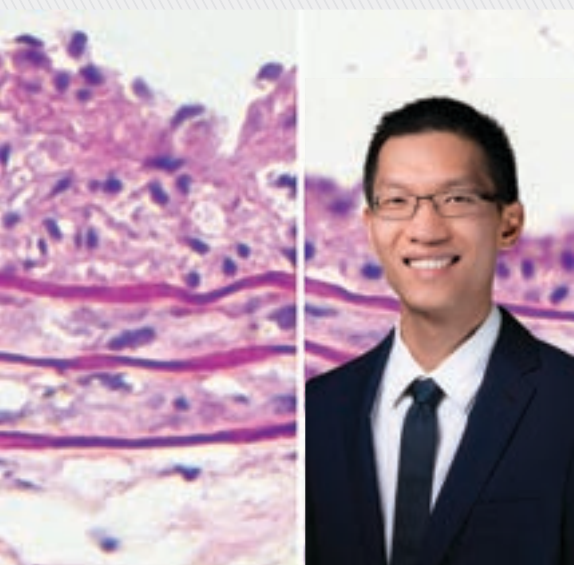
She became curious about the interplay between the food environment of neighborhoods and its effect on the development of atherosclerosis.

Could a preponderance of fast food outlets and convenience stores increase risk of cardiovascular disease for area residents?

Using data from participants in the Coronary Artery Risk Development in Young Adults (CARDIA) study, Kelman investigated whether increases in the neighborhood density of fast food chain restaurants and convenience stores were related to the development of coronary artery calcification (CAC, a measure of atherosclerosis, or, the narrowing of arteries due to plaque buildup) over time. She found that **middle-aged people with a 10 percent increase in the number of convenience stores in their neighborhoods were more than 30 percent more likely to develop CAC** over a 10-year follow-up — even after controlling for a variety of health behaviors, including smoking, alcohol use and fast food consumption, as well as personal health characteristics such as blood pressure and diabetes.

"While a number of studies have linked neighborhood characteristics to the development of subclinical atherosclerosis, we are one of the first to investigate longitudinal associations of fast food chain restaurants and convenience stores with the development of CAC," said Kelman, adding, "This research is

Role of Microbiome in Arterial Injury Response



The gut microbiome plays a role in a variety of processes, including inflammation and wound healing. Now, another of its roles has been uncovered by a team including Kelly Wun, a fourth-year medical student (who, at press time, found out he will complete his residency in orthopaedic surgery at Northwestern). He was the first author of a study (published in the journal *PLOS ONE*) demonstrating the role the microbiome plays in the development of restenosis, in which arteries re-close after a previous intervention to clear blockage. The discovery was made in the lab of Karen Ho, MD, assistant professor of Surgery in the Division of Vascular Surgery.

The team used germ-free mice, raised in completely sterile conditions, and thus lacking all microbiota. The scientists then compared the arterial injury response in the germ-free

mice with a group of conventional mice. They discovered that the germ-free mice developed significantly less neointimal hyperplasia (a form of scarring which is a major cause of restenosis) than the conventionally raised mice — illustrating the influence of microbiota on the arterial injury response. The findings suggest that **modulating microbiota may offer a novel approach to preventing restenosis in patients**, and Ho's laboratory is continuing to investigate other ways microbiota can impact inflammatory pathways after arterial injury.

“The microbiome is still a fairly unexplored field and lends itself to a lot more questions,” Wun explained. “An understanding of how the microbiome affects inflammation and these inflammatory pathways can represent potentially new therapeutic targets.”

significant because it supports the notion that cardiovascular health depends not only on the behavioral and biological characteristics of individuals, but also on the environments where people live.”

Kelman conducted the research, which was published in the *Journal of the American Heart Association*, under mentor Kiarri Kershaw, PhD, MPH, '12 GME, associate professor of Preventive Medicine in the Division of Epidemiology.



Largest Study of Medical Students' Views on ACA

Medical students have strong opinions about the Patient Protection and Affordable Care Act (ACA), yet their views on the subject have not been charted since the 2016 presidential election and the elimination of key ACA provisions. Fourth-year medical student Jourdan Rook, along with fellow medical students, Jacob Pierce and Antoinette Oot, and a team of students and faculty at six other medical schools, set out to get those voices heard, and the results of the study were published in *Academic Medicine*.

According to Rook, the study shows that medical students want an active and vocal role in the formation of health policy. “**Nearly nine in 10 students indicated that addressing health policy is a professional responsibility**,” he said. “This is a 30-percentage point increase from only three years prior.”

Conducted under the mentorship of Bruce Henschen, '12 MD, MPH, '15 GME, assistant professor of Medicine in the Division of General



Internal Medicine and Geriatrics, this was the largest study of medical student opinions regarding the ACA since the 2016 election. In total, 1,660 medical students from seven medical schools across the country responded to the survey. Results indicated that nine in 10 support the ACA and eight in 10 support the individual mandate.

“While the goal of research is to improve the world in which we live, it is a pleasant side effect that it improves us as investigators and physicians,” said Rook.

RESEARCH BRIEFS

DISEASE DISCOVERIES

Advances in the Study of Glioblastoma

Investigators across Northwestern's labs are determined to put an end to glioblastoma, the most common and aggressive type of brain tumor.

The investigators are members of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University.

A NEW ROLE FOR DOPAMINE



Scientists in the laboratory of Atique Ahmed, PhD, assistant professor of Neurological Surgery, investigated how activation of dopamine receptors plays a role in glioblastoma growth. The team demonstrated that dopamine signaling drives specific changes in glioblastoma cells, shifting them to become both more aggressive and resistant to therapy — even acquiring the ability to produce their own dopamine. The findings were published in *The Journal of Neuroscience*.

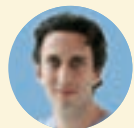
“This represents cancer cells hijacking a normal brain function in order to help themselves,” said research associate and co-first

author Jack Shireman. The findings could inform future treatment approaches. For example, existing FDA-approved drugs designed to reduce dopamine signaling could be repurposed for use in glioblastoma. The authors caution, however, that more research is needed before such an approach is ready for patients.

“These cells have a remarkable ability to detect changes in their environment and adapt to them. Our lab strives to better understand this, so we can develop more effective therapies,” said Ahmed.

The study was supported by the National Institute of Neurological Disorders and Stroke grant 1R01NS096376, the American Cancer Society grant RSG-16-034-01-DDC and National Cancer Institute grant R35CA197725 and P50CA221747 SPORE for Translational Approaches to Brain Cancer.

TUMOR MUTATIONS PREDICT RESPONSE TO IMMUNOTHERAPY

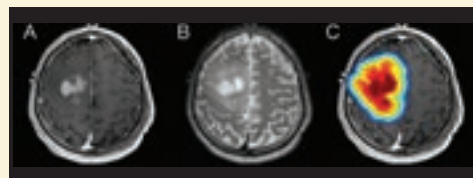


According to a study published by Northwestern investigators in *Nature Medicine*, the presence of certain mutations in tumors can influence how patients respond to immunotherapy.

Scientists profiled 66 patients with glioblastoma, tracking their response to PD-1 immune checkpoint inhibitor therapy over time. Genomic analysis revealed that many of the patients who did not respond to therapy had tumors with mutations in a gene called PTEN. These PTEN-rich tumors had gene expression that suggested a high number of regulatory T-cells. However, when the investigators examined the tumors, they didn't find

a high concentration of immunosuppressive T-cells in non-responder patients.

“We were scratching our heads,” said Adam Sonabend Worthalter, MD, assistant professor of Neurological Surgery and co-senior author of the study. “How could some tumors have higher levels of activation for the genes for the T-cells, but not have more of these cells?” They used RNA sequencing to look at the gene expression of individual tumor cells, finding that the tumor

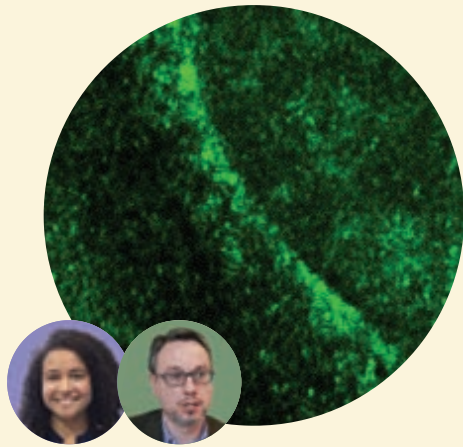


cells themselves were expressing the regulatory T-cell genes, potentially mimicking their function — a possible reason why immunotherapy would be less effective. Patient tumors with mutations in the MAP kinase (MAPK) pathway responded better to immunotherapy.

“Whereas careful validation of these findings is necessary, we have little to offer glioblastoma patients. So for the time being, if a patient of mine had these mutations, I would offer immunotherapy,” said Sonabend.

This work has been funded by National Institutes of Health grants R01 CA185486, R01 CA179044, U54 CA193313, U54 209997 and R01 NS103473; NSF/SU2C/JV-Foundation Ideas Lab Multidisciplinary Team PHY-1545805, 2018 Stand Up To Cancer Phillip A. Sharp Innovation in Collaboration Awards and Keep Punching Foundation, Northwestern 5DP5OD021356-04, P50CA221747 SPORE for Translational Approaches to Brain Cancer, developmental funds from the Lurie Cancer Center NCI Support Grant no. P30CA060553, the Medical Scientist Training Program T32GM007367, the CUJMC CTSA TL1 Precision Medicine Fellow 1TL1TR001875-01 and Swim Across America.

NEW GENE ASSOCIATED WITH GLIOBLASTOMA DISCOVERED



A gene called isocitrate dehydrogenase 3-alpha (IDH3A) promotes glioblastoma tumor growth, according to a study published in *Science Advances*. A drug that targets this gene could be a new therapy, said Alexander Stegh, PhD, associate professor in the Ken & Ruth Davee Department of Neurology in the Division of Neuro-oncology, and senior author of the study. Jasmine May, a seventh-year student in the Medical Scientist Training Program, was the first author.

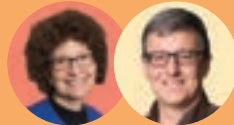
Stegh and his collaborators examined IDH3A levels in a large database of genetic data from glioblastoma tumors, and in tumors resected from Northwestern patients. The scientists found IDH3A was expressed at much higher levels in patient tumors than in normal brain tissue. They then tested its function in mice and found that elevated levels of IDH3A promoted tumor progression.

After further study, they found IDH3A allows rapidly dividing tumor cells to increase DNA synthesis, supporting cell division and unabated growth. A therapeutic approach targeting IDH3A could reduce the ability of tumor cells to synthesize DNA, according to Stegh. "Inhibition of DNA synthesis in turn is expected to reduce the growth of highly proliferative cancer cells," he said.

This research was supported by the Center for Cancer Nanotechnology Excellence Initiative of the National Institutes of Health (NIH), under awards U54 CA151880, 199091 and R01CA208783. Other NIH grants include T32 CA09560, T32 GM008152, R01CA193256, P30CA014236, R01LM011297 and R35CA197532. The study was also supported by the brain tumor SPORE grant P50CA221747.

CLINICAL BREAKTHROUGHS

New Technology in the NICU



The mass of wires that surround newborns in the NICU are often bigger than the babies themselves. Typically, five or six wires connect electrodes on each baby to monitors for breathing, blood pressure, heartbeat and more. Although these wires are crucial to the baby's well-being, they constrain movement and pose a major barrier to physical bonding during a critical period of development.

An interdisciplinary Northwestern team has found a way to replace that tangle of wires, developing a pair of soft, flexible wireless sensors that monitor babies without compromising parent-baby cuddling and physical bonding.

"We wanted to eliminate the rat's nest of wires and aggressive adhesives associated with existing hardware systems and replace them with something safer, more patient-centric and more compatible with parent-child interaction," said John Rogers, PhD, a bio-electronics pioneer and a professor of Neurological Surgery. He co-lead the study with Amy Paller, MD, chair and Walter J. Hamlin Professor of Dermatology

and a professor of Pediatrics, and Shuai (Steve) Xu, MD, MSc, an instructor of Dermatology and a Northwestern Medicine dermatologist.

The team completed a series of first human studies on premature babies at Prentice Women's Hospital and Ann & Robert H. Lurie Children's Hospital of Chicago. The study was published in the journal *Science*.

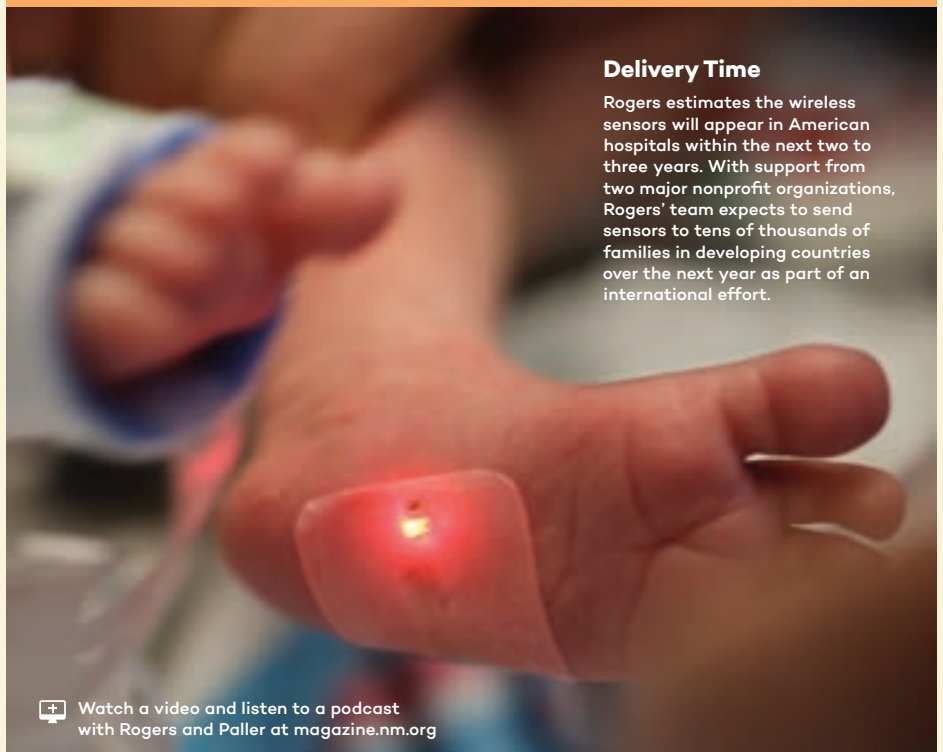
Going Beyond Current Possibilities

The benefits of the new technology reach beyond its lack of wires. The dual wireless sensors monitor babies' vital signs from opposite ends of the body, allowing physicians to gather an infant's core temperature as well as body temperature from a peripheral region. The wireless patches are also gentler on a newborn's fragile skin. Existing sensors are attached with adhesives that can blister and scar.

The study, "Dual wireless epidermal electronic systems with in-sensor analytics for neonatal intensive care," was supported by the Bill & Melinda Gates Foundation (PI Weese-Mayer), the Gerber Foundation (PI Weese-Mayer), the Friends of Prentice Foundation (PI Paller), the National Natural Science Foundation of China (award numbers 11402134 and 11320101001), the National Basic Research Program of China (award number 2015CB351900), the National Science Foundation (award numbers 1400159, 1534120 and 1635443) and the Future Growth Engine Program (award number 10079974), funded by the Ministry of Trade, Industry & Energy in South Korea.

Delivery Time

Rogers estimates the wireless sensors will appear in American hospitals within the next two to three years. With support from two major nonprofit organizations, Rogers' team expects to send sensors to tens of thousands of families in developing countries over the next year as part of an international effort.



Watch a video and listen to a podcast with Rogers and Paller at magazine.nm.org

SCIENTIFIC ADVANCES

GENE TRANSCRIPTION FACTOR CONTROLS FAT TISSUE EXPANSION



Subcutaneous fat tissue expanded while insulin sensitivity improved after a gene transcription factor was deleted, according to a new study published in *Cell Reports*.

This newfound function of the transcription factor, called BCL6, could have implications for obesity and Type 2 diabetes mellitus, according to Grant Barish, MD, assistant professor of Medicine in the Division of Endocrinology, Metabolism and Molecular Medicine and senior author of the study.

Recent work by Barish's laboratory revealed that BCL6 is highly expressed in adipocytes, or fat cells. To investigate its function, the team deleted BCL6 from the fat cells of developing mice. These mice selectively developed expanded subcutaneous fat tissue, but not intra-abdominal fat tissue — a rare example of a spontaneous phenotype impacting only certain body fat deposits.

Later, genome-wide DNA binding and RNA analysis revealed that BCL6 works to repress genes involved in the synthesis of fatty acids and growth.

Once BCL6 was deleted, the expression of those genes was increased, leading to the related changes of fat tissue expansion in mice.

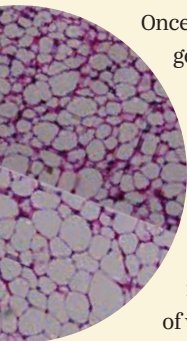
The same regulatory effects could be shared in humans, as well, according to the scientists.

In addition, while BCL6 deletion produced fatter mice, the animals developed improved insulin sensitivity — the opposite of what is typically observed with obesity.

“Normally, the more obese someone is, the more insulin resistant they become,” Barish said. “In contrast, mice lacking BCL6 in their fat are the opposite. They are more obese, yet less prone to diabetes.”

Understanding the basis by which obesity can be rendered more metabolically healthy could point to new strategies to treat diabetes as well as help scientists understand a curious sub-population of patients who retain insulin sensitivity despite being obese.

This work was supported by the Howard Hughes Medical Institute and National Institutes of Health grants DK057978, HL105278, R01DK108987, P30DK020595, and K08HL092298.



CLINICAL BREAKTHROUGHS

Eating Eggs and Cholesterol Linked to Heart Disease and Death Risk



A large new study published in *JAMA* reports adults who ate more eggs and dietary cholesterol had a significantly higher risk of cardiovascular disease and death from any cause.

“The take-home message is really about cholesterol, which happens to be high in eggs and specifically yolks,”

“THE TAKE-HOME MESSAGE IS REALLY ABOUT CHOLESTEROL, WHICH HAPPENS TO BE HIGH IN EGGS AND SPECIFICALLY YOLKS.”

said co-corresponding study author Norrina Allen, PhD, associate professor of Preventive Medicine in the Division of Epidemiology.

Previous studies found eating eggs did not raise the risk of cardiovascular disease. But those studies generally had a less diverse sample, shorter follow-up time and limited ability to adjust for other parts of the diet, Allen said.

“Our study showed if two people had the exact same diet and the only difference in diet was the eggs, then you could

directly measure the effect of the egg consumption on heart disease,” said Allen. “We found cholesterol, regardless of the source, was associated with an increased risk of heart disease.”

Exercise, overall diet quality and the amount and type of fat in the diet didn't change the association between the dietary cholesterol and cardiovascular disease and death risk.

The new study looked at pooled data on 29,615 U.S. racially and ethnically diverse adults from six prospective cohort studies for up to 31 years of follow-up and found eating 300 mg of dietary cholesterol per day was associated with 17 percent higher risk of incident cardiovascular disease and 18 percent higher risk of all-cause deaths. The cholesterol was the driving factor independent of saturated fat consumption and other dietary fat. The study also found that eating three to four eggs per week was associated with 6 percent higher risk of cardiovascular disease and 8 percent higher risk of any cause of death.

The study was supported in part by the American Heart Association and by the National Heart, Lung and Blood Institute grants R21 HL085375, HHSN268201300046C, HHSN268201300047C, HHSN268201300049C, HHSN268201300050C, HHSN268201300048C of the National Institutes of Health.



SCIENTIFIC ADVANCES

USING SERINE TO CONTROL INFLAMMATION



In a new study published in *Cell Metabolism*, investigators discovered a method to modulate levels of a protein that drives

inflammation by manipulating levels of the amino acid serine.

Inflammation has long been identified as a possible driver of many diseases, including cancer, cardiovascular disease and Alzheimer's. One cause of inflammation is the cytokine IL-1 β , a protein produced by macrophage cells.

In a series of experiments, scientists deprived macrophage cells of serine and then activated them with lipopolysaccharide, a molecule that normally causes high inflammation.

Without serine, which controls the synthesis of glutathione (an antioxidant), the cell's glutathione levels decreased. Since glutathione is necessary to support IL-1 β production, the experiment also caused levels of IL-1 β

to decrease, which meant the cell had less inflammation.

When the investigators then used a small molecule to inhibit that serine metabolism pathway in a mouse model, they found that it significantly decreased inflammation and improved survival in mice with sepsis. The next step is to examine whether other metabolic inputs can affect inflammation.

"This is just the tip of the iceberg," said Navdeep Chandel, PhD, the David W. Cugell Professor of Medicine in the Division of Pulmonary and Critical Care and of Biochemistry and Molecular Genetics, who led the research. Chandel is also the leader of the Membranes, Organelles & Metabolism Research Program at the Robert H. Lurie Comprehensive Cancer Center of Northwestern University.

"We're interested in understanding these pathways and whether drugs that affect the serine metabolism pathway could someday have value in dampening diseases that cause high inflammation."

This work was supported by National Institutes of Health grants SP01AGO49665, SP01HL071643, and ST32HL076139-15, and SDP1DK113643-03, with support from the Ford Foundation.



"THIS IS JUST THE TIP OF THE ICEBERG."

Inflammation has long been identified as a possible driver of many diseases, including cancer, cardiovascular disease and Alzheimer's. One cause of inflammation is the cytokine IL-1 β , a protein produced by macrophage cells.

DISEASE DISCOVERIES

Scientists Identify Therapeutic Target in Diabetic Kidney Disease



Diabetes can cause injury to the small blood vessels of the kidney, eventually leading to kidney damage. In North America, diabetic kidney disease is the most common cause of kidney failure, and rates of disease are expected to only continue to grow.

Scientists have identified a new therapeutic target that may help protect kidney function in patients with diabetes. The study, published in the *Journal of Experimental Medicine*, demonstrated in a preclinical model that inhibiting a protein called VE-PTP preserves microvascular and kidney function in diabetic mice. Susan Quaggin, MD, chief of Nephrology and Hypertension in the Department of Medicine and director of the Feinberg Cardiovascular and

Renal Research Institute, was the principal investigator of the study.

Previously, research in Quaggin's laboratory and others had suggested that the dysregulation of an important vascular signaling pathway called Angiotensin-TIE2 (known as TEK in humans) plays a key role in the progression of diabetic kidney disease. In the current study, Quaggin and an international team of collaborators investigated approaches to restoring the pathway.

"We thought that activating TIE2 — flipping on that switch — would be good because in other organs and diseases, it appears to make blood vessels happier and healthier," explained Quaggin.

In the study, the scientists discovered that a protein called VE-PTP is highly expressed in the kidney blood vessels of diabetic mice, and that the protein appears to be a marker of injured

blood vessels. Inhibiting VE-PTP restored TIE2 activity in mice, and protected the kidneys from damage due to diabetes.

Beyond furthering understanding of the fundamental biology underlying diabetic kidney disease, the findings also have important therapeutic implications.

"There are already preclinical molecules and drugs in the market that target VE-PTP and the TIE2/TEK pathway to treat eye disease. Our study suggests they might be valuable for kidney disease, too," Quaggin explained.

The *Journal of Experimental Medicine* study was supported by grants NIHRO1HL124120, T32DK108738, NIHRO1EY025799 and P30DK114857. Imaging was performed at the Northwestern University Center for Advanced Microscopy supported by NCI CCSG P30 CA060553 awarded to the Robert H. Lurie Comprehensive Cancer Center. The genetically engineered mice were generated with the assistance of Northwestern University Transgenic and Targeted Mutogenesis Laboratory (NIH grant CA060553). The metabolic analysis was supported by the Comprehensive Metabolic Core at Northwestern University. Quaggin holds patents related to therapeutic targeting of the Angiotensin-TEK pathway in ocular hypertension and glaucoma and receives research support, owns stock in and is a director of Mannin Research.

MEDIA SPOTLIGHT

HealthDay USNews CNN

Stem Cell Transplant May Help Some With Aggressive MS

A stem cell transplant may help some people with multiple sclerosis (MS) when standard drugs fail, a new clinical study reported in the *JAMA*. The study led by Richard Burt, MD, chief of Immunotherapy and Autoimmune Diseases in the Department of Medicine, followed 110 patients with aggressive cases of MS whose symptoms had flared up at least twice in the past year despite taking standard medication. Investigators randomly assigned the patients to either keep trying other medications or have a stem cell transplant — using cells taken from their own blood. Over an average of three years, MS progressed in 34 of 55 patients on medication, compared with only three of 55 patients given a stem cell transplant.

The New York Times

Why Do South Asians Have Such High Rates of Heart Disease?

A team of scientists have followed more than 900 South Asians in Chicago and the Bay Area. Their ongoing study, Mediators of Atherosclerosis in South Asians Living in America (MASALA), has found that South Asians tend to develop high blood pressure, high triglycerides, abnormal cholesterol and Type 2 diabetes at lower body weights than other groups. South Asian men are also prone to high levels of coronary artery calcium, a marker of atherosclerosis that can be an early harbinger of future heart attacks and strokes. Namratha Kandula, MD, MPH, associate professor of Preventive Medicine and of Medicine in the Division of General Internal Medicine and Geriatrics, and MASALA investigator at Northwestern, said she hopes to study the children of MASALA participants next because they tend to influence their parents' health and lifestyle habits, and the investigators want to understand whether or not health risks in second-generation South Asians are similar.



USNews HealthDay AP Associated Press

Nearly 1 in 4 Antibiotic Prescriptions Are Inappropriate

Nearly a quarter of antibiotics prescribed in 2016 were inappropriate for treating patients' associated health conditions, with about one in seven participants receiving at least one unnecessary prescription that year, according to a new study published in *The BMJ* which was co-authored by Jeffrey Linder, '97 MD, MPH, chief of Internal Medicine and Geriatrics in the Department of Medicine. "Inappropriate antibiotic prescribing to outpatients promotes the

development of antibiotic resistance, which is one of the greatest threats to public health worldwide," the report says. Despite three decades' worth of efforts to curtail over-prescribing of antibiotics, the study authors note that their results "show the widespread nature of inappropriate outpatient antibiotic prescribing at the level of both prescription fill and population."

The New York Times

Depression During and After Pregnancy Can Be Prevented, National Panel Says. Here's How.



As many as one in seven women experience depression during pregnancy or in the year after giving birth. Now, for the first time, a national panel of health experts says there is a way to prevent it. Women receiving one of two forms of counseling — cognitive behavioral therapy or interpersonal therapy — were 39 percent less likely than those who didn't to develop perinatal depression. One program highlighted in the report (which

was published in *JAMA*), "Mothers and Babies," includes cognitive behavioral therapy in eight to 17 group sessions, often delivered in clinics or community health centers, primarily during pregnancy with at least two sessions postpartum. "It's really meant to break down this idea that talking about your thoughts and behaviors is scary," said Shiv Darius Tandon, PhD, co-director of the Center for Community Health at the Institute of Public Health and Medicine (IPHAM), associate professor of Medical Social Sciences, and principal investigator of several "Mothers and Babies" studies.

FACULTY AWARDS & HONORS



Three faculty were honored during the 15th annual Lewis Landsberg Research Day on April 4:

• **Kathleen Green, PhD**, Joseph L. Mayberry, Sr., Professor of Pathology and Toxicology, and professor of Dermatology, received the Tripartite Legacy Faculty Award for Translational Science and Education. 📍 1

• **Tamara Isakova, MD, MMSc**, director of the Center for Translational Metabolism and Health at the Institute of Public Health and Medicine (IPHAM), and associate professor of Medicine in the Division of Nephrology and Hypertension; and **John Varga, MD**, the John and Nancy Hughes Distinguished Professor of Rheumatology, and director of the Northwestern Scleroderma Program, are recipients of the 2019 Mentor of the Year Award. 📍 2

J. Chad Duncan, PhD, associate professor of Physical Medicine and Rehabilitation, has been named director



of the Northwestern University Prosthetics-Orthotics Center (NUPOC) and formally assumed his leadership role on January 1, 2019.

Zeeshan Ahmad Butt, PhD, associate professor of Medical Social Sciences, Psychiatry and Behavioral Sciences and of Surgery in the Division of Organ Transplantation, has been named director of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University Outcomes Measurement and Survey Core. 📍 3

John Crispino, PhD, the Robert I. Lurie, MD, and Lora S. Lurie Professor of Medicine in the Division of Hematology and Oncology, and of Biochemistry and Molecular Genetics; **Arthur Prindle, PhD**, assistant professor of Biochemistry and Molecular Genetics; and **Derek Wainwright, PhD**, assistant professor of Neurological Surgery, and Microbiology-



Immunology, are the first recipients of the inaugural Hippocratic Scholar Award, funded by the Hippocratic Cancer Research Foundation. The award supports highly innovative, cutting-edge basic science or translational research projects that will advance the efforts of Lurie Cancer Center members to eliminate cancer.

Ankit Bharat, MBBS, the Harold L. and Margaret N. Method Research Professor of Surgery, has been named chief of Thoracic Surgery in the Department of Surgery.

Jacob Sznajder, MD, the Ernest S. Bazley Professor of Asthma and Related Disorders, and professor of Medicine in the Division of Pulmonary and Critical Care and of Cell and Molecular Biology, has been selected to receive the Trudeau Medal at the American Thoracic Society 2019 International Conference. 📍 4



Joan Anzia, MD, '83 GME, vice chair for education in the Department of Psychiatry and Behavioral Sciences and professor of Medical Education, and **Gurava Agarwal, MD, '11 GME**, assistant professor of Psychiatry and Behavioral Sciences and of Medical Education, were awarded the Innovation Award for Physician Wellness for their development of the Scholars of Wellness (SOW) program. SOW is a professional development program with the objective to create a critical mass of wellness experts to drive meaningful change at Northwestern. 📍 5

Hossein Ardehali, MD, PhD, director of the Center for Molecular Cardiology and professor of Medicine in the Division of Cardiology and Pharmacology, was elected to serve as the president of the American Society for Clinical Investigators. Ardehali will begin his tenure as vice



president in 2019-2020, then serve as president-elect in 2020-2021, president in 2021-2022 and immediate past president in 2022-2023.

Robert Bonow, MD, vice chair for development and innovation in the Department of Medicine and the Max and Lilly Goldberg Distinguished Professor of Cardiology, was named the 2019 Distinguished Scientist (Clinical Domain) by the American College of Cardiology Awards Committee. 📍 6

Katherine L. Wisner, MD, the Norman and Helen Asher Professor of Psychiatry and Behavioral Sciences and of Obstetrics and Gynecology, received the Outstanding Achievement in Psychiatric Research Award at the Illinois Psychiatric Society annual meeting.

Bruce Bochner, MD, the Samuel M. Feinberg Professor of Medicine in the Division of Allergy



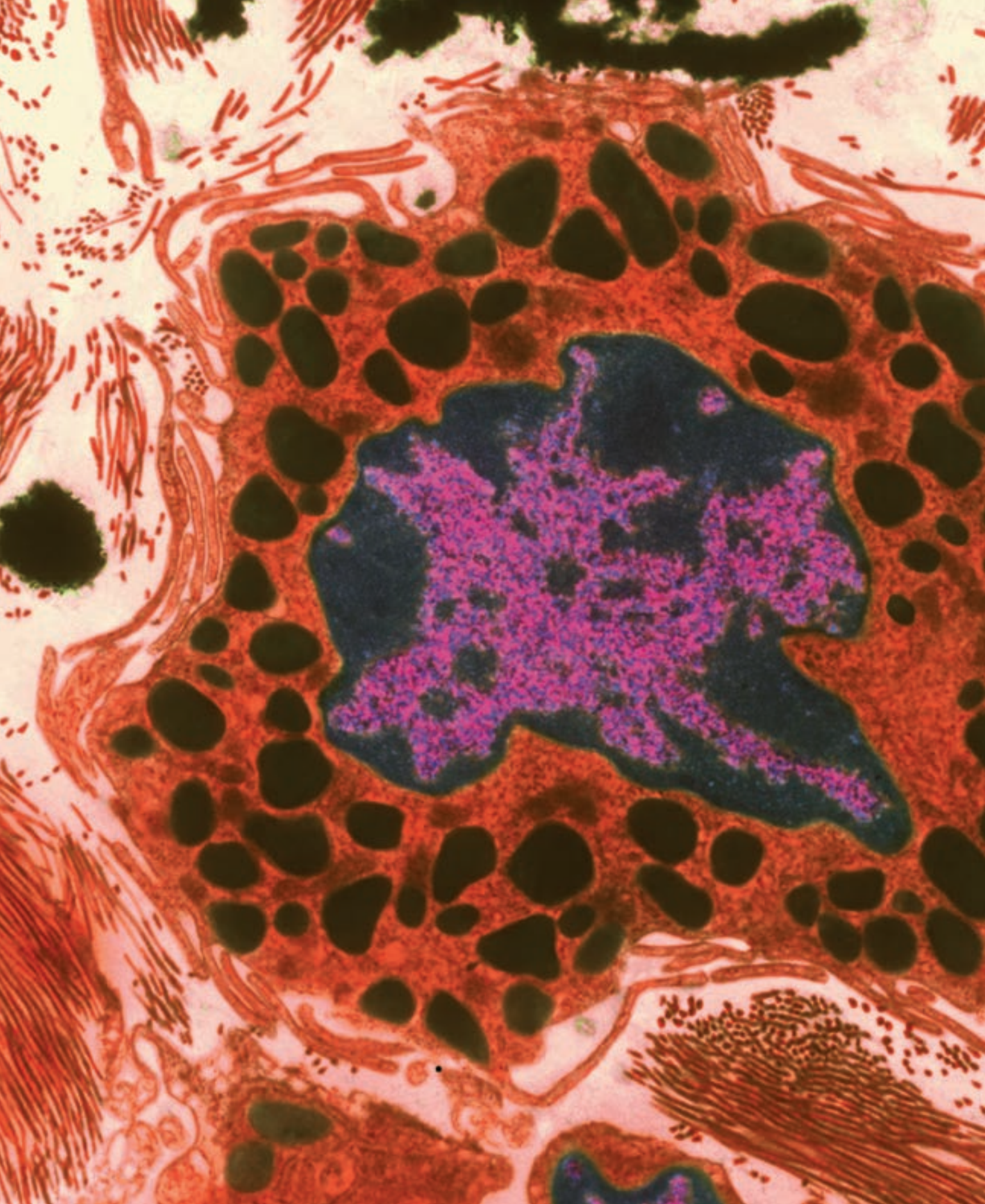
and Immunology, was named the recipient of the 2019 American Academy of Allergy Asthma and Immunology Mentorship Award.

Teepu Siddique, MD, the Les Turner ALS Foundation/Herbert C. Wenske Professor of Neurology and of Cell and Molecular Biology was among the 19 Northwestern Medicine physicians named "2019 Top Doctors" by *Chicago* magazine. Siddique has held this honor for 18 consecutive years.

The following faculty have been invested into endowed professorships:

• **Rod Passman, MD**, professor of Medicine in the Division of Cardiology and Preventive Medicine, as the Jules J. Reingold Professor in Electrophysiology

• **Kurt Lu, MD**, associate professor of Dermatology, as the Eugene and Gloria Bauer Professor of Dermatology 📍 7





FRIENDLY FIRE

Left: Colored transmission electron micrograph of a section through a mast cell.

EXPLORING THE ORIGINS OF AUTOIMMUNITY TO FIND NEW THERAPIES.

WRITTEN BY EMILY AYSHFORD

The National Institutes of Health estimates that up to 23.5 million Americans suffer from an autoimmune disease, and the prevalence is rising. Some autoimmune diseases are life-threatening; most require a lifetime of treatment. Some, such as Type 1 diabetes, multiple sclerosis, lupus and rheumatoid arthritis, are well known; others are rare and difficult to diagnose.

Understanding and treating these diseases requires new ways of thinking about the immune system, at the cellular, molecular and genetic levels, as well as at the organ and body-wide levels. Northwestern physicians and scientists are collaborating to examine just how this system functions — and how they can use that information to both find innovative therapies and stimulate it to work even better.

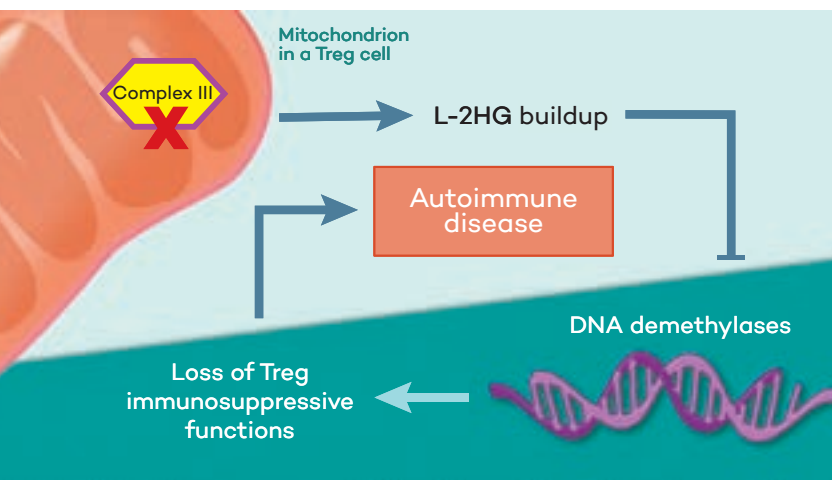
INNER WORKINGS OF CELLS

While T-cells help provide immunity to the body, a subset of those cells, regulatory T-cells (Treg cells), modulate the immune system and suppress aberrant immune responses against self-antigens. They also maintain helpful bacteria in the gut (even in fetuses in utero), thus ensuring the body does not become inappropriately inflamed. Now, Northwestern scientists have discovered that a specific mitochondrial protein complex is essential to this immunosuppressive activity. The study was published in *Nature*.

It started five years ago, with what seemed like a simple question, posed by Navdeep Chandel, PhD, the David W. Cugell, MD, Professor of Medicine in the Division of Pulmonary and Critical Care and of >>

Biochemistry and Molecular Genetics: What do mitochondria do in a Treg cell? When investigators in Chandel’s lab removed mitochondrial function from Treg cells in mice, the mice rapidly developed autoimmune diseases. The Treg cells were alive and functioning without mitochondria, but they weren’t doing their job keeping inflammation in check.

Investigators found that by removing a specific protein within mitochondrial complex III, the cell suffered a buildup of the metabolite L-2-hydroxyglutarate (L-2HG) that diminished the function of DNA demethylases enzymes. This action, in turn, altered DNA methylation marks that suppressed the ability of Treg cells to function as an immune system referee.



“It’s very much a network,” explains Chandel’s collaborator and study co-author Benjamin Singer, MD, assistant professor of Medicine in the Division of Pulmonary and Critical Care and of Biochemistry and Molecular Genetics. “When you change one little piece, the downstream effects are dramatic.”

That built-up metabolite could be an underlying cause for autoimmune disorders, according to Chandel.

“It opens a whole new way of thinking about cell biology and diseases,” he says. Understanding the cellular metabolic mechanisms that cause autoimmunity could also provide a new way for the body to harness autoimmunity in situations where it is preferable — in fighting tumors, for example.

“The real dream would be to uncover a causal mechanism that leads to medication or cell-based therapies,” Singer adds.

FROM LABORATORY MISTAKE TO DISCOVERY

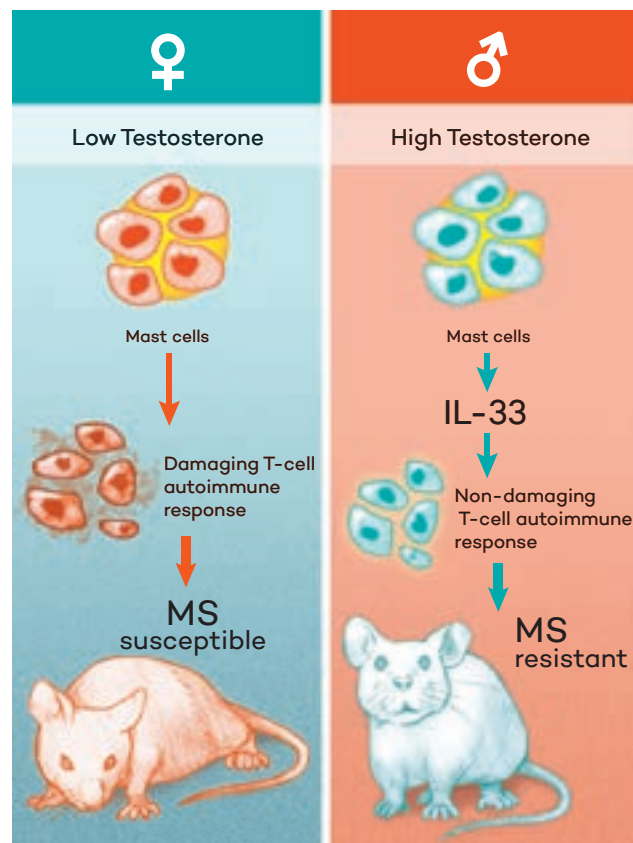
Sometimes, a new way of thinking about the immune system comes from an honest research mistake. That’s what Melissa

Brown, PhD, professor of Microbiology-Immunology, discovered several years ago.

Brown studies how the immune system’s lymphocyte cells are affected by the body’s innate cells. Innate cells provide the body with general immunity by acting as barriers and recruiting immune cells to sites of infection. One type of these innate cells is mast cells, which are found in most tissues of the body, including the brain and spinal cord. They work as a first defense to protect the body against pathogens. They also play a role in allergic reactions.

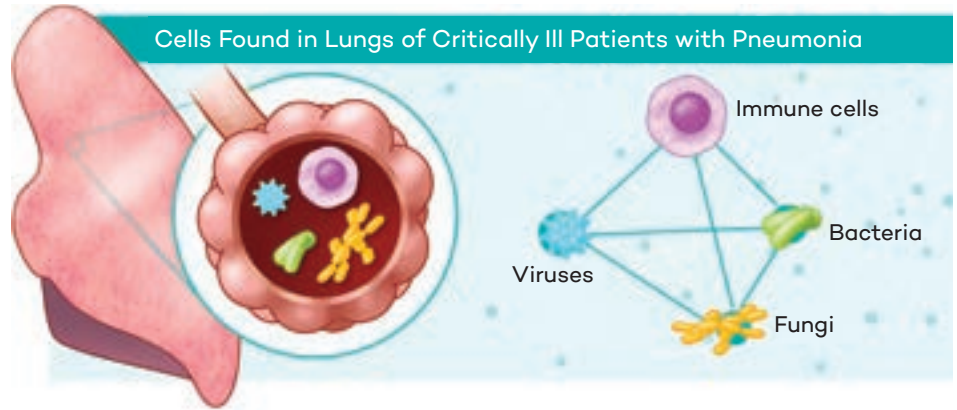
Because more than 75 percent of those diagnosed with an autoimmune disease are women, when immunologists like Brown study the diseases in mice they usually use only females. While studying female mice with multiple sclerosis (MS), Brown found that the disease was reduced significantly in those mice that had been genetically engineered to lack mast cells. But the research was flipped on its head when a new graduate student conducted the same study using male mice. The experiment was an accident — the student did not know the lab only used female mice in its experiments. The results were striking.

“We got the exact opposite response,” Brown says. “While females without mast cells had disease reduction, males without mast cells got very sick.” That finding led



“WE NEED TO FIND A WAY TO MODULATE THAT INTERACTION BETWEEN BACTERIA AND THE HUMAN IMMUNE SYSTEM. WE ARE TRYING TO PUT THE WHOLE PICTURE TOGETHER.”

RICHARD WUNDERINK, MD



WHERE IMMUNITY GOES RIGHT — AND WRONG

Proteins offer clues to how our immune system responds:

- In studying lupus, investigators found that the loss of a protein called Bim in immune cells called macrophages led to the development of a lupus-like disease in mice. The research, conducted by Harris Perlman, PhD, the Mabel Greene Myers Professor of Medicine and chief of Rheumatology in the Department of Medicine, shows that the protein may help control macrophage function and could be a target for lupus treatment.
- When a patient has a heart attack, key heart cells called cardiomyocytes die and need to be cleared away for the heart to heal. Research led by Edward Thorp, PhD, associate professor of Pathology and Pediatrics, identified a protein called MerTK that enables macrophages to engulf the dying cells and promoted anti-inflammatory proteins that encourage healing. His team also found that a protein called CD47 prevented this clearing, and by blocking the protein, they could enhance healing.
- Scientists have discovered that three proteins — POP1, POP2 and POP3 — play a role in controlling inflammatory processes and preventing systemic inflammation. Most recently, Christian Stehlik, PhD, adjunct professor of Medicine in the Division of Rheumatology, found that POP2 inhibited a key inflammatory pathway.

Brown to ask a different question. Instead of focusing on what caused MS in female mice, she began to search for what conferred protection in male mice.

It turned out that testosterone primes male mast cells to make a guardian molecule called IL-33, which protects against autoimmunity. When Brown gave female mice IL-33, she found that not only did it prevent MS from developing, but it also reversed established disease. The findings were published in *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*.

“That’s the holy grail in MS,” she says. “Not only do you want to stop progression, but you also want to reverse the damage already done.”

Her lab is now studying whether IL-33 treatment in mice is safe and free from possible damaging side effects with hopes of ultimately using this molecule to treat human patients. Though human trials are further down the road, Brown’s research has been rejuvenated by the finding. “We really have in sight the possibility that there is a therapy that can reverse MS,” she says.

WHOLE SYSTEM APPROACH

Understanding what happens within a cell’s mitochondria or how a disease reacts to a molecule is just one part of understanding how immunity and

autoimmunity work throughout the body’s complex network.

That’s why Singer and his colleague, Richard Wunderink, MD, professor of Medicine in the Division of Pulmonary and Critical Care, are conducting a multi-year investigation that examines all the cells — bacteria and immune cells — within the lungs of patients with pneumonia so severe that they are on ventilators in the ICU. Using bioinformatics, the investigators hope to put together all the pieces of the puzzle that determines why some patients with pneumonia respond to antibiotics, while others don’t.

“To do that, we are taking a systems biology approach,” Wunderink says.

A routine clinical procedure called non-bronchoscopic bronchoalveolar lavage allows access to these patients’ lungs. It involves squirting saline solution deep within the lungs and then sucking it back out to obtain a rich collection of cells, including bacteria, viruses, fungi and immune system cells. The investigators then separate out those cells, measure them and sequence them to get a systems-level understanding of the immune response.

“Our hypothesis is that an interaction among all these cells is allowing bacteria to survive, affecting immunity,” Wunderink says. “We don’t just need to kill bacteria better. We need to find a way to modulate that interaction between bacteria and the human immune system. We are trying to put the whole picture together.” **NM**

Northwestern Medicine's
Mobile Stroke Unit brings
lifesaving care to patients.

HEALING IN MOTION

WRITTEN BY CHERYL SOOHOO

Two years ago, Cynthia Reid had just done a load of laundry in her Glen Ellyn, Illinois, home, when she walked into her kitchen and suddenly collapsed to the floor. Her young stepson found her moments later and frantically went for help. "My husband came into the room and said, 'Give me your hand,'" she recalls. "But I couldn't move my left side or hand." Reid had suffered an acute ischemic stroke: A clot was blocking blood flow to her brain. It was 10:30 on a Saturday morning, and with each passing minute, 1.9 million of her neurons were dying from lack of oxygen. She faced the risk of lifelong disability or death.

For many individuals experiencing stroke symptoms, a prompt 911 call and ambulance dispatched by local emergency medicine services (EMS) offers the best route to care at a hospital. For those in Chicago's western suburbs, though, Northwestern Medicine has gone one step further to reduce time to treatment by bringing a "mini-ER" to the patient's location. In January 2017, Northwestern Medicine Central DuPage Hospital (CDH) unveiled the first Mobile Stroke Unit in Illinois. In its first year of operation, the specially outfitted ambulance bested traditional transport and treatment in a stroke center by delivering lifesaving clot-busting medication between 30 and 40 minutes faster.

"I am very happy with how far I have come since my stroke," says Reid, now 49, who today has regained most of the mobility on the left side of her body except for her hand. "I am more than grateful for them saving my life."

A state-of-the-art vehicle more than double the length and weight of an average ambulance, Northwestern Medicine's Mobile Stroke Unit features a 16-slice CT scanner that provides detailed brain imaging, telemedicine capabilities linked to stroke radiologists and neurologists at CDH and the clot-buster drug known as tissue plasminogen activator (tPA). All of these elements, as well as a mobile and hospital-based stroke team, allow this on-the-go stroke unit to save more lives and improve outcomes.



Cynthia Reid's life was saved by the speed and skill provided by the Mobile Stroke Unit.



The multidisciplinary crew is prepared to respond at a moment's notice and partner with local EMS providers to deliver the highest level of care outside of the hospital.

TIME IS OF THE ESSENCE

Strokes afflict some 850,000 Americans annually, with incidences of the neurological condition increasing each year. By 2025, 1.2 million new cases are expected in the United States. In 1996, tPA became the only Food and Drug Administration-approved drug therapy for breaking up the clot of an ischemic or thrombotic stroke. Used every day in stroke centers nationwide, the IV drug is most effective when



administered as soon as an individual or that person's family member, coworker or neighbor recognizes the symptoms of stroke — from slurred speech and loss of balance to a droopy face or eyelid — and seeks immediate medical attention. If tPA is given within the first 60 minutes following the onset of symptoms, 50 percent of patients return to baseline within days. If given after that critical time, only 25 percent may avoid permanent neurological disability.

A powerful blood thinner, tPA can lead to deadly consequences if used on patients with hemorrhagic stroke caused by a burst blood vessel or other head trauma involving potential bleeding in the brain. Diagnostic imaging via a brain CT scan is essential to correctly identifying the cause of a patient's stroke before the administration of the drug. While tPA has always been portable, large bulky CT scanners require sensitive calibration to produce accurate images. Only in the past decade have new advances allowed for mobile CT devices that can withstand bumpy roads and still function, with the first mobile stroke units appearing in Europe. Northwestern Medicine Central DuPage Hospital soon saw an opportunity to acquire a Mobile Stroke Unit — one of only a dozen or so in the nation — to positively influence stroke outcomes and ultimately reduce the need for further rehabilitative or nursing home care. >>



LIFESAVING ON THE GO

Equipped with state-of-the-art technology, the mobile unit allows a specially trained crew to rapidly diagnose and treat stroke patients outside the hospital setting.

Critical Medication

Care providers have access to stroke-reversing medications and IV pumps for administering specialized medicine typically only found in the hospital.

Telemedicine on Demand

Encrypted, real-time video conferencing enables live assessments by physicians who specialize in stroke neurology and radiology.

CT Scanner

A full-size, hospital-grade CT scanner is capable of providing detailed brain images on the go.

Critical Supplies

The unit is outfitted with advanced airway management equipment and portable lab equipment that allows for immediate blood-sample analysis.



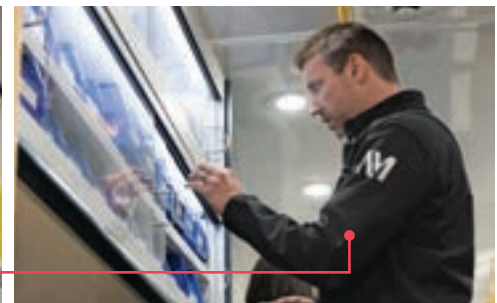
Balancing Act

To ensure the CT scanner images are of the highest quality, hydraulic jacks auto-level the ambulance prior to any imaging studies.

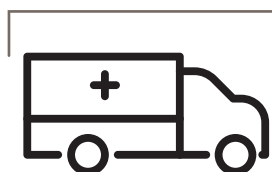


Always Prepared

The crew works in tandem with local EMS providers and specialists at the hospital to deliver the appropriate treatment quickly.

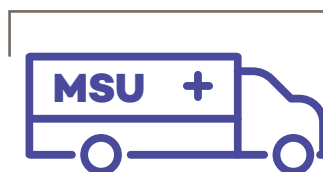


Average Ambulance



22 feet

Mobile Stroke Unit Ambulance



36 feet



The MSU delivers stroke intervention in half the time of conventional care.

2X faster to care



“WE CAN BE DISPATCHED TO A PATIENT’S LOCATION AND PROVIDE DIAGNOSIS AND TREATMENT WITHIN THE CRITICAL ‘GOLDEN HOUR.’” — Harish Shownkeen, MD

“We wanted to be leaders in utilizing technology as well as give back to our community,” says Harish Shownkeen, MD, who initiated and championed the acquisition of the Mobile Stroke Unit. He serves as medical director of the mobile unit as well as the Stroke and Neurointerventional Surgery Programs at CDH. “The greatest impact is when a 911 call comes, we can be dispatched to a patient’s location and provide diagnosis and treatment within the critical ‘golden hour.’ No time is wasted picking up the patient and bringing them to the hospital before treatment can begin.”

In its first year, the Mobile Stroke Unit team treated 27 percent of eligible patients with tPA within one hour of the onset of symptoms. That percentage has now gone up to 34 percent. The ultimate goal is 50 percent, which Shownkeen acknowledges is influenced by factors beyond their control. “Nothing happens until someone calls 911,” he explains. “The challenge is that less than 30 percent of people can name two signs of stroke. Only some 45 percent of patients call 911. Others don’t call at all and drive themselves to the hospital.”

Promoting stroke public awareness offers an avenue for speeding up diagnosis and treatment. To that end, Shownkeen recently secured a \$300,000 grant to launch a community education program in the CDH service area.

FULLY EQUIPPED

Compared to the average 22-foot-long ambulance, the 36-foot Mobile Stroke Unit occupies the largest ambulance bay at Central DuPage Hospital. Its hours of operation run from 8 a.m. to 8 p.m., seven days a week. “We developed the schedule to correlate with the peak times when stroke patients come into the hospital,” says Mehr Mohajer-Esfahani, MSN, RN, program manager of the Mobile Stroke Unit. “People often don’t wake up in the middle of the night because of a stroke.”

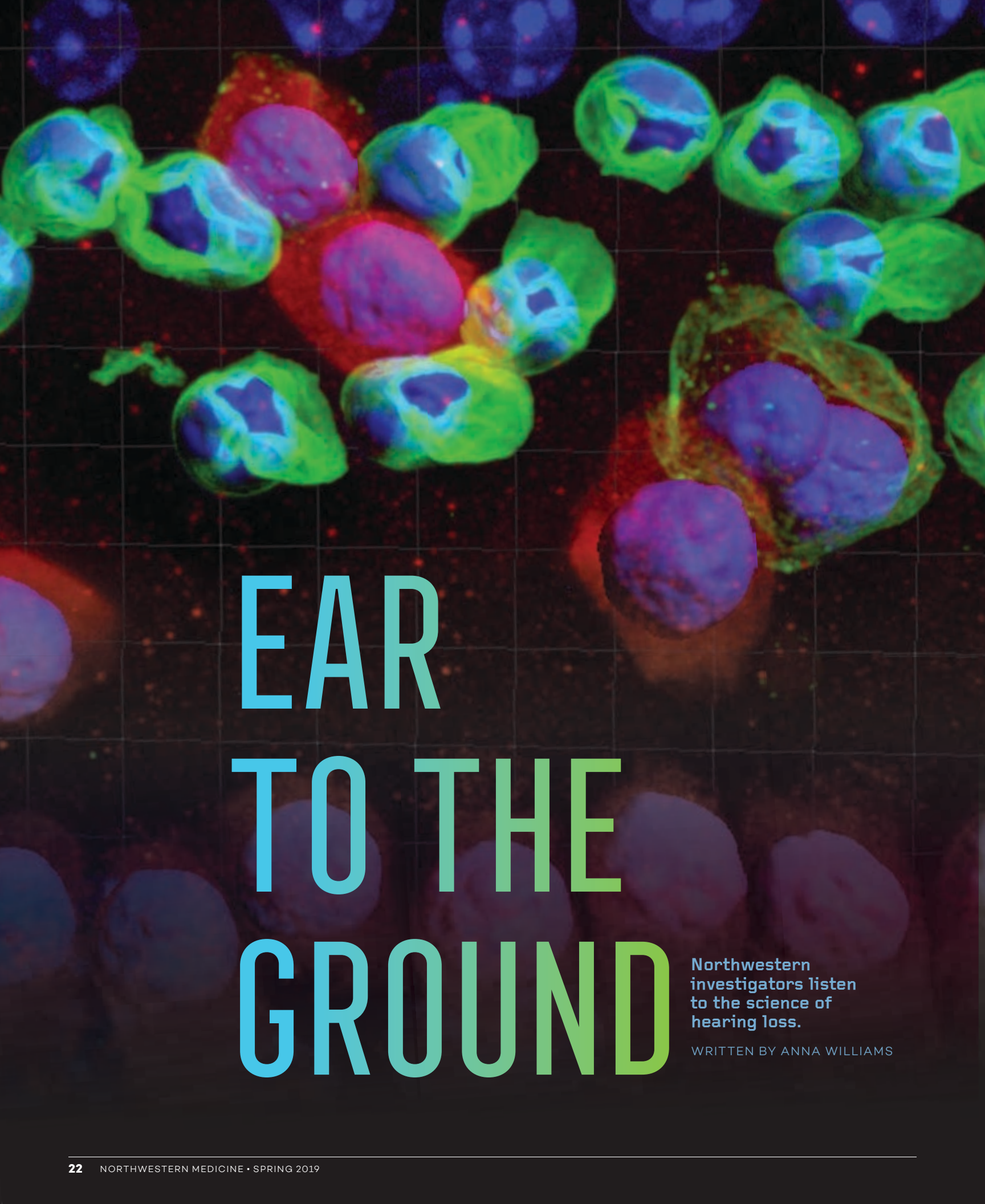
The Mobile Stroke Unit provides coverage to the hospital’s Emergency Medical Services area, which includes Carol Stream, Glen Ellyn, Roselle, West Chicago, Wheaton and Winfield, and is dispatched by 911 at the same time as local EMS. Expanding its reach even further, a secondary partnership allows fire department and other ambulance services outside the service area to request the Mobile Stroke Unit. The location of the patient will dictate where the unit goes — directly to the individual or somewhere along the local EMS’ route to a stroke center. Despite its mobility, the vehicle’s CT scanner can only be operated while the vehicle is motionless and on level ground.

“While we are on our way, local paramedics scan the scene and look for a place where we can park, which could be on the street in front of a patient’s house or a couple of blocks away,” Mohajer-Esfahani says. “The ambulance has hydraulic jacks that help level it out on uneven surfaces.”

During a typical 12-hour shift, the Mobile Stroke Unit team includes a driver who can safely navigate the 33,000-pound vehicle with sirens and lights blaring; a critical care paramedic; a critical care nurse and a CT scanner technologist. The team then uses a direct telemedicine connection to consult with a radiologist and a stroke neurologist at the hospital, who can “set eyes” on and assess the patient in the ambulance. Once it is determined that tPA treatment is needed, the team starts both the infusion process and the ambulance, which will then begin transporting the patient to the hospital. At CDH, the team hands off the patient for additional care and evaluation.

FULL CIRCLE

This January, Reid’s father-in-law was sitting in his Carol Stream family room when he called out to his wife, Mary Ellen, and couldn’t say her name. She immediately suspected a stroke and called 911. As in the case of Reid, local EMS was dispatched as well as the Mobile Stroke Unit. Reid’s father spent two days in the hospital. Several months later, Reid reports he is now doing well. “My in-laws knew about the Mobile Stroke Unit because of me, but what are the odds it would help them too?” Reid says. “I can’t say this enough, but we are so lucky to be in a community that has such a valuable service.” **NM**



EAR TO THE GROUND

Northwestern
investigators listen
to the science of
hearing loss.

WRITTEN BY ANNA WILLIAMS

Jaime García-Añoveros, PhD, professor of Anesthesiology, Neurology and Physiology, is committed to identifying treatments for hearing loss.



“THIS DISCOVERY IS A MILESTONE TOWARD HEARING RESTORATION.”

Deep inside the ear sits the cochlea, a small snail-shaped structure that holds the hair cells responsible for human hearing. Named for the hair-like tufts that protrude off their tops, these cells are critical to converting sound waves into neural messages. But unlike skin or other cell types, human hair cells do not regenerate on their own. And once the cells are injured — whether due to loud noises, toxins or normal aging — the damage can lead to lasting hearing loss. Today more than 36 million Americans suffer from hearing loss to some degree.

There has been significant interest in artificially regenerating new hair cells as a treatment for hearing loss. However, the research has long been thwarted by a fundamental roadblock: There are two types of hair cells, inner and outer hair cells, which play complementary roles in hearing and are both essential. Yet the genetic factors required to make one cell type versus the other were completely unknown.

Now, a landmark genetic discovery in the laboratory of Jaime García-Añoveros, PhD, professor of Anesthesiology, Neurology and Physiology, may have finally cleared a path toward novel regenerative treatments.

The findings, published in *Nature* in late 2018, demonstrated that a gene called *INSM1* is essential for the development of outer hair cells. The death of these cells is the most common cause of deafness.

“This discovery is a milestone toward hearing restoration,” says Teerawat Wiwatpanit, ’18 PhD, first author of the paper and a recent alumnus of Feinberg’s Driskill Graduate Program in Life Sciences (DGP). “With the mechanisms we identified, we’ve advanced the knowledge for the development of regenerative approaches to reverse hearing loss.”

The discovery is the result of years of dedicated investigation in the García-Añoveros laboratory and strong collaborations in auditory research across Northwestern. It’s also one with deep scientific roots that stem back to an obscure discovery made in worms more than two decades ago.

Model Science

In the late 1990s, García-Añoveros and Anne Duggan, PhD, were doctoral candidates studying nerve cells in the worm *Caenorhabditis elegans*. While working in the laboratory of Nobel Laureate Martin Chalfie, Duggan

molecularly identified for the first time a transcription factor in the worm that is required to make two types of mechanosensory cells (cells that respond to mechanical stimuli, such as touch or vibration) different from each other. Curiously, when the gene was removed, cells of the first type appeared to be transformed into cells of the second type.

While the findings, published in *Genes & Development*, were intriguing, García-Añoveros and Duggan put the project aside as they went on to complete postdoctoral fellowships at Harvard Medical School and later establish a lab at Northwestern in 2002.

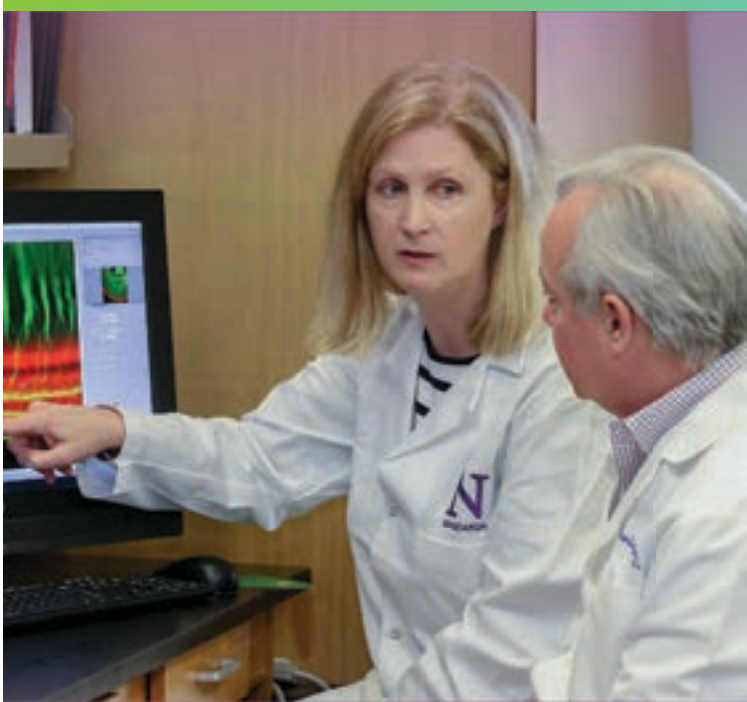
Initially, García-Añoveros and Duggan, now a research assistant professor of Anesthesiology, focused their research on pain neurons. After moving on to study other sensory cells in mammals, they decided to investigate whether the mammalian equivalent to the gene Duggan had first identified in *C. elegans* — called *INSM1* in mammals — might play a similar role in mice. Looking at inner and outer hair cells — two similar types of mechanosensory cells — the scientists found that *INSM1* was expressed in outer hair cells but not in inner hair cells.

“This was reminiscent of what Anne had been studying in worms in graduate school 20 years ago. We thought, what if it’s doing the same thing?” García-Añoveros says. >>

36M+

MORE THAN 36 MILLION AMERICANS SUFFER FROM HEARING LOSS TO SOME DEGREE.

A mutant ear lacking the *INSM1* gene, in which about half of the outer hair cells have converted (trans-differentiated) into inner hair cells.



Decades of work by García-Añoveros and Anne Duggan, PhD, led to the recent discovery that the INSM1 gene is critical to the development of outer hair cells.



Teerawat Wiwatpanit, '18 PhD, is first author of the paper and a recent alumnus of Feinberg's Driskill Graduate Program in Life Sciences (DGP).

When the scientists mutated INSM1 in the mouse cochlea, they discovered that cells born embryonically as outer hair cells transformed into mature inner hair cells, according to García-Añoveros. “This is remarkable because nematodes [roundworms] have mechanosensory cells but nothing like outer hair cells, which are unique to mammals.”

The team demonstrated that in outer hair cells, INSM1 blocks the expression of a key set of genes specific to inner hair cells. In other words: in order to make an outer hair cell and prevent conversion to an inner hair cell, the INSM1 gene is critical.

“The data was very clear. There was little ambiguity, which rarely happens in science,” explains Wiwatpanit, who recently accepted a faculty position at Thailand’s equivalent of the National Institutes of Health. “When we

removed the INSM1 gene from the mice, they had a form of hearing loss characteristic of outer hair cell impairment. And then when we looked into the morphology of the ear, it was absolutely gorgeous. You see a complete transformation of many outer hair cells into inner hair cells.”

“THERE WAS LITTLE AMBIGUITY, WHICH RARELY HAPPENS IN SCIENCE. WHEN WE REMOVED THE INSM1 GENE FROM THE MICE, THEY HAD A FORM OF HEARING LOSS CHARACTERISTIC OF OUTER HAIR CELL IMPAIRMENT.”

The scientists had pinpointed a novel mechanism for how two cells born seemingly identical become two very different cell types.

“This has opened up an entirely new area of research. Until now, no one had a clue of how to make an outer hair cell as opposed to an inner hair cell,” says García-Añoveros, also a member of Northwestern’s Knowles Hearing Center and of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University. “This opens the way to try generating outer hair cells in adults and to developing treatments for most cases of deafness.”

Moving Forward

García-Añoveros notes that it was the scientific environment at Northwestern that helped make the discovery possible. “Collaboration

is critical,” he says. “When we first moved here, we had very little work on hearing. What allowed us to excel was the ability to team up and learn from investigators here. Northwestern has been a powerhouse in hearing for decades.”

For example, the team has worked closely with collaborator Mary Ann Cheatham, PhD, research professor in the Auditory Physiology Laboratory at Northwestern’s School of Communication, who led the testing of mouse hearing.

Throughout the years, the investigators have also provided important insights in other aspects of hearing. In 2008, García-Añoveros, in collaboration with James Bartles, PhD, professor of Cell and Molecular Biology, published a study in *Proceedings of the National Academy of Sciences* identifying a novel mechanism of hearing loss. In 2015, the research team discovered a pain pathway in the inner ear that warns of dangerously loud noise, findings spotlighted in *Nature Reviews Neuroscience* and published in *Current Biology*. Additionally, in early 2018, Wiwatpanit was the first author of a paper published in *The Journal of Neuroscience* that found the loss of two lysosomal calcium channels leads to early-onset hearing loss. This discovery suggested the importance of lysosomes in the survival of hair cells.

Now, on the heels of the *Nature* paper, the scientists are forging ahead to deepen understanding of INSM1 to strengthen the potential for translation to treatment.

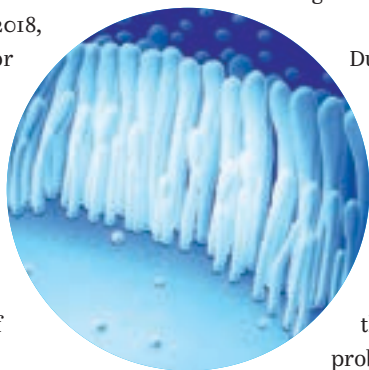
“A lot more basic research will have to be done, but we’re already providing tools for people who are trying to develop these

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treatments,” García-Añoveros says. “We found one key player, and now we want to find all the other players. My goal is to, in the next decade, crack in detail how the two cells become different because that will be an essential tool for regeneration attempts.”

For García-Añoveros and Duggan, the *Nature* study also underscores an important tenet of biomedical research: Basic science will build the path toward discoveries that eventually improve human health.

“If you focus on something that is a fundamental problem, it’s likely to have repercussions. Although we have now moved on to the medically relevant organ, the cochlea, we benefited from the early work in model systems,” García-Añoveros says. “You have to understand the basic process first. To me, what is fascinating is not why we grow deaf, but how is it that we hear?” **NM**



An illustration of the stereocilia, hearing cells in the cochlear duct in the cochlea.

Improving Outcomes for Deaf Children

Auditory research at Northwestern spans a wide spectrum from basic science discoveries to clinical interventions. For example, in a recent international collaboration co-led by Nancy Young, MD, '87 GME, professor of Otolaryngology — Head and Neck Surgery and medical director of Audiology and Cochlear Implant Programs at Ann & Robert H. Lurie Children’s Hospital of Chicago,



A child can actively participate in sports with a cochlear implant.

scientists developed a machine

learning algorithm that uses brain scans to predict language ability in deaf children after they receive a cochlear implant. The findings were published in *Proceedings of the National Academy of Sciences* in early 2018. “Our study is the first to provide clinicians and caregivers with concrete information about how much language improvement can be expected given the child’s brain development immediately before surgery,” Young says. “The ability to forecast children at risk is the critical first step to improving their outcomes.”

Like Father, Like Son

WRITTEN BY WILL DOSS

James Carr followed his radiologist father's footsteps but is forging his own path as Radiology chair.

Throughout their four-year education, medical students ponder their future sub-specialty. Their top choice may change once, twice or a dozen times, reflecting experiences in the classroom and on clinical rotations. However, for one student at the Royal College of Surgeons in Dublin, Ireland, there was a single thought on his mind.

"Because my father was a radiologist, I thought I was going to stay well clear of radiology," says James Carr, MD, '00 '01 GME, chair and the Drs. Frederick John Bradd and William Kennedy Memorial Professor of Radiology.

The young physician very nearly chose cardiology, but in the end, he followed in his father's footsteps. Carr completed a radiology residency program at Saint Vincent's Hospital, also in Dublin. He never left his interest in the heart behind, though, focusing on the burgeoning field of cardiac imaging. This decision would lead him to Chicago for a fellowship in radiology, to a professorship at Northwestern and as of November 2018, to the chairmanship of the department.

Radiology holds a unique position within medicine. Radiologists primarily serve other physicians in the care of patients. This indirect clinical care approach puts a particular onus on collaboration, a philosophy that was instilled in Carr both through his training and through his father's advice.

"One of the things I've learned is that we must work together, across specialties, to provide information that will help other physicians manage their patients better," says Carr, who is also a professor of Medicine in the Division of General Internal Medicine and Geriatrics, and a professor of Biomedical Engineering at the McCormick School of Engineering. Spending much of his career improving cardiac magnetic resonance imaging (MRI) to inform patient management, Carr knows that collaboration is essential in the areas of research and education as well clinical care.

"If you don't have the interdisciplinary framework, the enterprise falls apart pretty quickly," Carr says.

FRUITS OF LABOR

In 2003, then-assistant professor Carr became director of Cardiovascular Imaging at Northwestern Memorial Hospital. Carr was tasked with building a clinical cardiac MRI program, which, up until this point, existed mostly within the realm of research. Cardiac MRI, which has its experimental roots at Northwestern, could detect scarring on the heart. This sophisticated imaging technology allowed clinicians to predict how patients might respond to bypass surgery without resorting to invasive tests. There was just one problem—nobody knew about it.

"We didn't have a lot of patients, as not many referring physicians knew about this new modality," Carr says.

To get the word out, he helped build a program to instruct residents and physicians in this unfamiliar procedure. Training physicians in cardiac MRI both created and met demand, as did a symbiotic expansion of Northwestern's cardiac surgery program. The largest benefit, though, came from the proliferation of Feinberg-trained cardiac radiologists and cardiologists.

"We sent these ambassadors out into the community, and they became sources of knowledge," Carr explains. "It was an unintended objective, initially, but my cardiology colleagues and I realized we could actually set the standard for how you use cardiac MRI."

The modality is no longer used only for projecting recovery from bypass surgery. Today clinicians also employ it for evaluating heart failure and helping determine the effectiveness of drug therapies in other cardiac diseases. The majority of referrals at Northwestern still come from Feinberg-trained physicians — a testament to the reciprocal relationship between education and clinical care.

ALL HANDS ON DECK

About a decade later, another of Carr's projects showcased radiology's unique >>

“My cardiology colleagues and I realized we could actually set the standard for how you use cardiac MRI.”



Carr with Ali Serhal, MD, (left) and Kongkiat Chaikriangkrai, MD, both cardiovascular imaging fellows.

position in the department's tripartite mission. In 2014, Carr, along with co-primary investigator Michael Markl, PhD, the Lester B. and Frances T. Knight Professor of Cardiac Imaging in the Department of Radiology, received a \$3 million National Institutes of Health grant to develop an MRI test to detect complications in patients after heart transplant.

The current method to diagnose transplant complications is with a biopsy. This new MRI protocol measures inflammation of the heart, providing a quantifiable metric that can inform clinicians if the patient is rejecting their new heart. The investigators recruited patients who underwent heart transplants at Northwestern Memorial. While early work in the project focused on developing new MRI techniques, more recent publications have demonstrated its clinical effectiveness to the extent that it has already become standard practice at Northwestern Medicine. "For example, just the other day I evaluated two heart transplant patients using MRI," Carr says. "It's becoming quite integrated into the clinical algorithm here."

This discipline-spanning project includes Feinberg radiologists and cardiologists, McCormick medical physicists and engineers, and even industry partners at Siemens. It aptly reflects how the research enterprise operates in the department, according to Carr.

"One of the reason Northwestern attracts world-class investigators is its collaborative spirit," he says. "That's how we've structured our research program."

LOOKING FORWARD

These experiences feed into Carr's governing philosophy as chair. Above all, he knows radiology can't go it alone. Dimly-lit reading rooms can sometimes isolate radiologists from their clinical colleagues. They also tend to experience fewer face-to-face interactions with other physicians. However, Carr believes that tight-knit relationships between radiology and other Feinberg departments, Northwestern schools and among the entire Northwestern Medicine hospital system, are the key to breakthroughs in the laboratory and in the clinic.

Since his appointment as chair late last year, he's initiated a new focus on informatics

and data sharing. Carr has been working closely with Senta Berggruen, MD, '04 GME, associate professor of Radiology and residency program director, to begin overhauling trainee education to get students out of the back rooms and onto the clinic floor. Establishing this foundation is important, as radiology, still reeling from the shift from film to digital images, has more major changes on the horizon.

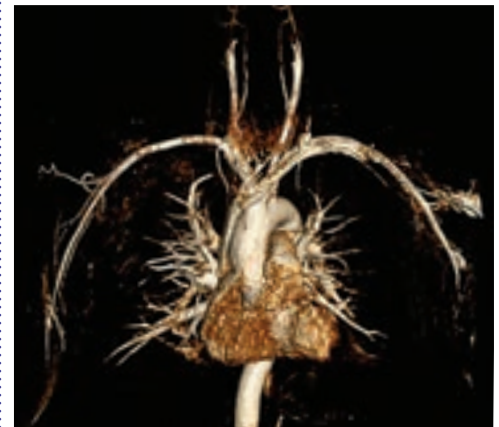
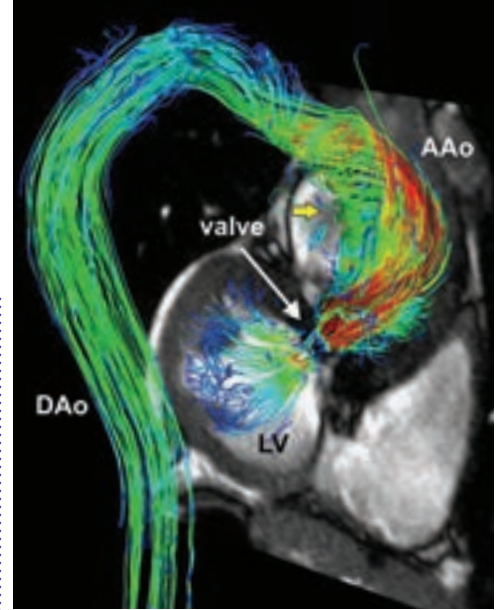
As a primarily physician-service subspecialty, radiology depends on sharing images and patient data from physician to physician and from hospital to hospital. There is a dizzying array of moving parts: picture archiving and communications systems (PACS), electronic medical records and dictation software used by radiologists to record diagnoses. All of these pieces must be compliant with patient privacy laws. A robust information technology infrastructure is required to quickly share these images and clinical information. "We need to develop processes so the services we provide can occur in a seamless manner," says Carr, who plans to establish a dedicated informatics program within radiology.

Medical education is rapidly transforming, moving away from didactic lectures and toward interactive learning. In this area, Carr is helping tweak the Diagnostic Radiology Residency Program to follow that trend. For example, putting radiology trainees on clinical rotations makes them immediately available to read images on the hospital floor where they can be in direct contact with physicians and patients. "This is just one of the ways that we're trying to pull radiologists out of those back rooms," Carr says.

Additionally, the radiology residency programs now feature a wide variety of educational tracks, including courses in business, research or global health. Trainees, for example, have traveled to South America as part of an international aid organization to perform diagnostic ultrasounds in underprivileged communities.

These foundations put the department on strong footing for the future, which promises even more technological change and subsequent adaptation. Much has been made about the possibility of artificial intelligence (AI) replacing or crowding out the radiologist.

In the near term, though, Carr sees AI as a way



Advanced MRI techniques at Northwestern Radiology allow for detailed insights into cardiovascular diseases. Top: 3D blood flow dynamics after heart valve repair (TAVR). bottom: MRI angiography of the thoracic vessels.

of augmenting physicians — rather than an existential threat — to handle the massive amounts of information that newer modalities can generate. For example, a cardiac MRI study can easily produce 4,000 images in a single patient's study. "It's just not possible for a single human being to comprehend and understand all of that," Carr says. "We need AI to help the radiologists do their job."

Launching new AI research initiatives will pull from every discipline and challenge scientists, but Feinberg is uniquely positioned to be a leader in the budding science.

"Developing algorithms and partnering with our colleagues in Evanston and the larger industry will allow us to build a robust research program," Carr says. "Because of our clinical volume and our digital infrastructure, we are poised to drive this whole area forward from a research perspective." **NM**



Raising the Profile of the MAAB

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

Hello Feinberg alumni!

I am taking over the reins as the new Medical Alumni Association Board (MAAB) president. A big thank you goes to Jim Kelly, '73 MD, for his leadership and dedication as president of our Alumni Board during these past two years.

A graduate of Northwestern's Honors Program in Medical Education (HPME), I work in medical education and thoracic surgery at the University of Michigan Medical Center. For the past few years, I have been fortunate to participate on the alumni board and have led the Mentoring and Engagement Committees. I am committed to increasing engagement and raising the profile of the alumni association to current students and residents, medical school alumni and GME alumni.

The Mentoring Committee, under the leadership of Emily Martin Jones, '08 MD, '11 GME, assistant professor of Medicine and Orthopaedic Surgery, and Dan Schwarzlose, assistant director of Alumni Engagement at Feinberg, have partnered with the undergraduate campus on several key initiatives.

"My goal as alumni board president is to recognize alumni who help out our students and, in turn, Feinberg."



The Northwestern Network Mentorship Program

creates connections between undergraduates, medical students and alumni, and fosters mentor-mentee relationships. Currently, we have 238 Feinberg alumni participating in the network, with 199 medical students. Among Northwestern's other schools, we have 5,890 alumni, with 1,983 students. Our goal is to reach 100 percent current student participation and provide these students with as many alumni mentors as possible.

To become a mentor, register here:

<https://mentor.northwestern.edu/>

The HOST (Help Our Students Travel)

program gives MD alumni an opportunity to assist graduating seniors during the residency interview season. Our fourth-year students incur an average of \$3,000 in travel costs during this critical time in their medical careers. Alumni can relieve the financial burden by serving as hosts when students are in their area. This year, the HOST program — with 233 alumni hosts in 30 states — saved our students an estimated \$10,000! My goal as alumni board president is to recognize alumni who help out our students and, in turn, Feinberg. Thank you for staying engaged and GO CATS!

If you'd like to sign up to host a student, register here: https://mentor.northwestern.edu/programs/feinberghost/alumni_hosts



From left: Reddy; Christopher Davis, '14 MD, MPH, '16 GME; and Vin Sandhu, '87 MD, MBA, connect with students during Alumni Weekend 2018.

RICHARD GILLUM, '70 MD

MAXIMUM IMPACT

Distinguished Alumnus Uncovers Inequities in Heart Health

As the first African-American internal medicine intern at Peter Bent Brigham Hospital (now Brigham and Women's Hospital) in Boston, and the only black student in his medical school class at Northwestern, Richard Gillum, '70 MD, has played a pioneering role in the field of medicine.

His career has not only led the way for other African-American physicians, but also helped to reveal how social determinants of health can greatly impact heart disease. In recognition of his many contributions, Gillum, an adjunct professor of medicine at Howard University College of Medicine, received Northwestern University Feinberg School of Medicine's Distinguished Medical Alumnus/a Award presented at Alumni Weekend in April.

"Northwestern provided a quality education and a credential that has opened doors for me throughout my career," Gillum says. Learning from faculty like Jeremiah Stamler, MD, professor emeritus of Preventive Medicine in the Division of Epidemiology, also inspired him to specialize in cardiovascular epidemiology. He noted that the growing emphasis on prevention in cardiology over the last half century has led to dramatic declines in heart



disease-related deaths, a public health aim that Stamler championed.

“Cardiology offers much to patients, but almost no heart disease is curable,” explains Gillum, who earned a master’s degree in epidemiology at Harvard University after completing his cardiology training at Brigham. “Prevention based on evidence from epidemiology offered me an opportunity for greater impact than clinical medicine.”

SOCIAL DETERMINANTS

Researching cardiovascular epidemiology, first at the National Institutes of Health, then at the University of Minnesota, and later the U.S. Centers for Disease Control and Prevention National Center for Health Statistics, put Gillum at the forefront of discoveries about disparities in heart health. He has authored more than 300 publications on how factors such as socioeconomic status, racial and ethnic disparities, and leisure time activity modulate heart risks.

“The research process has been a gratifying endeavor as each discovery led to new questions and opportunities to find answers,” he says.

Gillum served as a consultant on the ground-breaking Meharry Cohort Study launched in the early 1980s at Meharry Medical College, a historically black university in Nashville. The study followed more than 300 black physicians and some 600 white physicians for decades and yielded insights on the incidence and risk factors for cardiovascular disease in black individuals of higher socioeconomic status. Many other longitudinal studies at the time enrolled only white patients or only black patients who were of lower socioeconomic status.

“Dr. Gillum influenced [research on disparities in health] way before it was popular,” notes John Fontaine, MD, MBA, president of the Association of Black Cardiologists (ABC). Gillum



Those of us who were privileged to obtain training in cardiology needed to assertively seek to expose to full view disparities that were not widely acknowledged and to open doors to training closed by custom, if not law.

and Fontaine serve together on the editorial board of the *Journal of the National Medical Association*, a peer-reviewed publication dedicated to reducing health inequity especially among African Americans and other minority groups. “Dr. Gillum has covered the spectrum of educational activities and services that really goes well beyond what most physicians have done in their careers,” Fontaine says.

TACKLING DISPARITIES

In addition to a prolific research career, Gillum, who studied writing during his medical training,

has been an outspoken advocate against discrimination in medicine. He believes that “physicians and poets have a social responsibility to comment on their times.”

In 1974, Gillum joined 16 other likeminded physicians to found the Association of Black Cardiologists (ABC). They launched the organization — now with 1,800 members — to tackle cardiovascular disease in minority patients and boost diversity in the field of cardiology with mentoring and support for subspecialty training.

“Even with the civil rights movement well under way at that time, it was clear that removing legal barriers to advancement of minorities was insufficient to eliminate racial inequity in health and access to care,” Gillum says. “Those of us who were privileged to obtain training in cardiology needed to assertively seek to expose to full view disparities that were not widely acknowledged and to open doors to training closed by custom, if not law.”

Gillum has been gratified to see growing numbers of black cardiologists. He acknowledges, though, there remains much more to do to eliminate disparities in healthcare. Political and global economic trends along with a history of discrimination in the United States continue to stymie progress in his opinion. “Without continued advocacy, farsighted leadership and political will another 40 years will pass without meaningful change toward equalizing educational and economic opportunities and access to care,” Gillum says.

In the meantime, there is much individual physicians can do to help their patients be as healthy as possible.

“I urge physicians to resist being so enthralled by technology that they devote insufficient priority to prevention,” he says. Active in his Methodist church, Gillum also encourages health providers to “not ignore the spiritual aspects of health and well-being important to many, if not most, patients.”

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.



Erin Riggle, MD, '06, '09 GME (pictured with arrow), embarked on her first mission overseas, serving on an intensive care unit headed to Cambodia and Vietnam. She, along with alumni **Norman Wang '94, '98 MD, '02 GME, '07 GME**; **William "Willie" Choe, '92 MD, '00 GME**; and **Srikanth Sundaram, MD, '05, '06 GME**, are working on an international mission dedicated to providing medical care to those in need. 📷 1

1950s

Jerrold J. Weinstock, '59 MD, is a psychiatrist and self-published author of "Insult to Our Planet and the Florida Keys." For over 50 years, Weinstock has lived in the Florida Keys fishing the Atlantic and the Gulf waters off of Key West. In the book, he shares exciting stories and photos of his past in sport-fishing. 📷 2

1970s

Loren Stolle, '73 MD, has retired after 38 years of internal medicine practice in San Francisco. Stolle's wife, Barbara, is a 1973 nurse graduate of the former Wesley Hospital Chicago and received her master's degree in nursing administration from University of California, San Francisco. She also just retired after 38 years as a hospital nurse supervisor. Stolle hopes to have more time to travel, golf and enjoy other hobbies.

Leo A. Gordon, '73 MD, is writing a book about medical education from 1960 to 1980, described as a lighthearted memoir of a very specific time in the history of medical education in the United States. One of the chapters describes Gordon's introduction to clinical medicine as a third-year medical student in the neurology service. This particular chapter has been recorded as a podcast. If any member of that class would like to relive their introduction to clinical medicine, please contact Gordon at LeoGordonMD@gmail.com for a copy of the podcast.

John R. Lumpkin, '75 MD, has been named president of Blue Cross Blue Shield of North Carolina Foundation. Lumpkin most recently

served as senior vice president of the Robert Wood Johnson Foundation.

George A. Williams, '78 MD, began his term this year as the 2019 president of the American Academy of Ophthalmology. Williams was elected to the position by the Academy's global community of 32,000 ophthalmologists. Williams is chair and director in the Department of Ophthalmology of the Beaumont Eye Institute at Beaumont Health in Royal Oak, Michigan, as well as professor and chair of Ophthalmology at Oakland University William Beaumont School of Medicine. He also is a partner with Associated Retinal Consultants.

1980s

Michael S. Parmacek, '81 MD, '87 GME, who serves as the Frank Wister Thomas Chair in the Department of Medicine at the University of Pennsylvania Perelman School of Medicine, was inducted into the National Academy of Medicine in Washington, D.C. 📷 3

Karen L. Kaul, MD, PhD '84, recently completed her duties as president of the American Board of Pathology (she remains a trustee) and also as a member of the Accreditation Council for Graduate Medical Education Residency Review Committee for Pathology. She continues to serve as chair of Pathology at NorthShore University HealthSystem, and remains actively involved in molecular pathology and personalized medicine. 📷 4

Jennifer Lim, '86 MD, '87 GME, was one of six women inducted to the McAuley Hall of Honor at Mother McAuley Liberal Arts High School in Chicago, Illinois, in April 2019. Lim holds the

Marion H. Schenk Esq., chair in Ophthalmology for Research in the Aging Eye as a professor of Ophthalmology and director of the Retina Service at University of Illinois at Chicago, where she specializes in surgical and medical retinal diseases.

Lim has received numerous professional awards and distinctions, including the American Academy of Ophthalmology Lifetime Achievement Award and the Association for Research in Vision and Ophthalmology Gold Award. She was the inaugural University of Illinois at Chicago Distinguished Sweeney Lecturer and

was among those named “Chicago Super Docs,” “Best Doctors in America,” and “Top Doctors.” Lim has authored or co-authored over 300 articles, 30 book chapters and edited several books, including “Age-Related Macular Degeneration,” which is currently in its third edition.

Kimberly Bass, '87 MD, an ophthalmologic surgeon, gave up her lucrative private practice in Saint Paul, Minnesota, to pursue humanitarian efforts in ophthalmology in developing countries. In 2007, Bass began to volunteer for two organizations that sponsor medical missions: SEE International and Medical Ministry International. In that time, Bass has operated on over 400 patients in five countries. Her crusades have also become a family affair. In 2018 and 2013, her husband, **Benjamin Gulli, '87 MD**, joined her on her medical mission to Peru as an orthopaedic surgeon, alongside their two children who assisted Bass in the eye clinic and observed eye surgeries. 📷 5

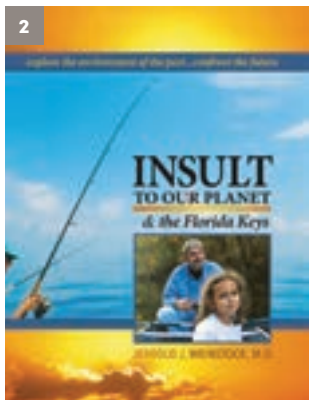
1990s

Martin S. Zand, '92 MD, '90 PhD, was appointed senior associate dean for Clinical Research at the University of Rochester. Zand is currently co-director of the Clinical and Translational Science Institute and has active research programs in B cell immunology, computational modeling and health informatics. He has lived in Rochester, New York, for the last 20 years with his wife, Ellen Ingram, and two daughters, Adrienne and Sonia. 📷 6

Raymond Sanchez, '94 MD, was recently appointed chief medical officer at Cerevel Therapeutics, a biopharmaceutical company focused on developing new medicines to treat disorders of the central nervous system (CNS). Sanchez is a veteran CNS medicine developer and will oversee clinical development of the company's pipeline. 📷 7

John Santopietro, '95 MD, has been named the first physician-in-chief of Hartford HealthCare

MICHAEL S. PARMACEK, '81 MD, '87 GME, WAS INDUCTED INTO THE NATIONAL ACADEMY OF MEDICINE IN WASHINGTON, D.C.





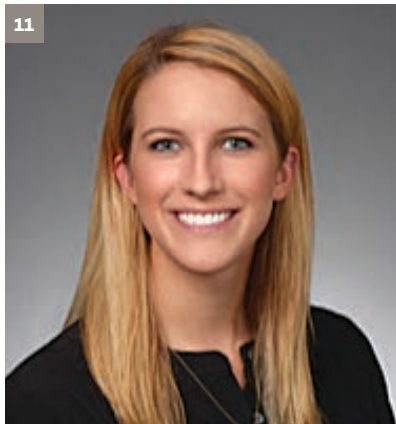
2000s

David A. McClusky, '00 MD, was named chairman of the board for the Idaho Department of Corrections. McClusky previously served as the director of Surgical Skills Training and Simulation at Emory University and surgical representative to the Emory Center for Experiential Learning Advisory Group. 9

Maulik Majmudar, '04 MD, was appointed as chief medical officer of Health and Wellness at Amazon. Prior to joining Amazon, he practiced cardiology and served as associate director of the Healthcare Transformation Lab at Massachusetts General Hospital, and was a visiting scientist and lecturer at Massachusetts Institute of Technology. He recently located to Medina, Washington, with his family, including his three-year-old son and six-month-old twins.

William Tseng, '04 MD, was promoted to associate professor of Surgery at Keck School of Medicine at University of Southern California (USC). As a specialist in soft tissue sarcoma, Tseng also leads the Retroperitoneal Sarcoma Surgery Program at USC.

Tseng was also featured in *The New York Times*, *Washington Post* and other national and international news outlets for his work as lead surgeon in a rare surgical case with a patient presenting with a cancerous tumor weighing 77 pounds. He writes, "Retroperitoneal sarcomas are very rare (0.2 percent of all cancers), challenging to treat and also the largest tumors in the human body!" Tseng mentions that it is the largest tumor he's seen (and operated on). 10



Behavioral Health Network in Hartford, Connecticut. He also will serve as senior vice president and remain part-time as psychiatrist-in-chief emeritus at the Institute of Living. Santopietro most recently served as president and medical director of Silver Hill Hospital in New Canaan, Connecticut.

Erik K. Alexander, '97 MD, was named associate dean of Medical Education and professor of Medicine at Harvard Medical School. Alexander currently serves as chief of Thyroid Section, Brigham and Women's Hospital, and as executive director of the Brigham Education Institute. 8

ERIK K. ALEXANDER, '97 MD, WAS NAMED ASSOCIATE DEAN OF MEDICAL EDUCATION AND PROFESSOR OF MEDICINE AT HARVARD MEDICAL SCHOOL.

2010s

Muthu Vaduganathan, '12, MD, '12 MPH, has been named the first place winner of the American College of Cardiology Young Investigator Award in the Clinical Investigations category.

Amy Rogers, '16 MD, has been selected as an Internal Medicine chief resident at Stanford Medicine for the 2019–2020 academic year. While at Feinberg, Rogers chaired the Student

In Memoriam

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

ALUMNI

Russell C. Rowan, '43 MD
Albion, Michigan
FEBRUARY 16, 2019

John H. Lindberg, '48 MD, '49, '53, GME
Seattle, Washington
DECEMBER 18, 2018

Richard E. "Dick" Meyer, '50 MD
Romeoville, Illinois
DECEMBER 20, 2018

Merritt G. Ringer, Jr., '51 MD
Carmel, California
DECEMBER 25, 2018

Richard M. Chubb, '54 MD, MPH
Pittsburg, Kansas
JANUARY 8, 2019

Carl R. Coleman, '54 MD
Powell, Ohio
MARCH 21, 2019

Lawrence B. Keithly, '54 DDS
Boise, Idaho
DECEMBER 31, 2018

Richard E. Land, '56 MD
Cranston, Rhode Island
FEBRUARY 13, 2019

Gunars Medins, MD, '57, '59, '60 GME
Gainesville, Georgia
FEBRUARY 11, 2019

Nicholas C. Katris, '59 DDS
Northfield, Illinois
JANUARY 1, 2019

Edwin Kellerman, '59 MD
Philadelphia, Pennsylvania
JANUARY 20, 2019

Karen E. Christianson, BSM '59
Moline, Illinois
JANUARY 17, 2019


Patrick F. Jewell, MD, '63 GME
Lincoln, California
DECEMBER 12, 2018

Harold E. Harris, Jr., '64 MD
South Hadley, Massachusetts
FEBRUARY 19, 2019

Palmer J. Blakley, '90 MD
Tinley Park, Illinois
MARCH 23, 2019

FACULTY

Thomas Stafford
clinical assistant professor of Ophthalmology
Highland Park, Illinois
OCTOBER 13, 2018

Committee on Global Health and served as class president during her fourth year of medical school. Rogers intends to pursue a career in Rheumatology-Immunology.  11

GME


J. Regan Thomas, MD, '79 GME, received the Model Mentor of the Year Award by the Young Physician Section of the American Academy of Otolaryngology — Head and Neck Surgery and was also presented with the Honor Award by the Mexican Society of Otolaryngology Head and Neck Surgery for contributions to Mexican ear, nose, throat and facial plastic surgery education. Thomas currently serves as professor of Otolaryngology — Head and Neck Surgery at Northwestern University Feinberg School of Medicine.

Robert Buckingham, MD, '79 GME, has completed his fourth and fifth book, subsequently

“HOW DANCING STOPS THE CLOCK’ DETAILS THE BUTTRESSING OF PRO-INFLAMMATORY END ORGAN INTERSTITIAL SPACE SIGNALING MOMENTUM VIA A ROBUST CAPILLARY CELL PIVOT AND SWING DANCE.”

—ROBERT BUCKINGHAM, MD, '79 GME

titled “Rejuvenation 2.0!” and “How Dancing Stops the Clock.”

He writes, “How Dancing Stops the Clock’ details the buttressing of pro-inflammatory end organ interstitial space-signaling momentum via a robust capillary cell pivot and swing dance. The dance sustains capillary cell pluripurpose with regards to sustaining interstitial space sanitation and restoring its own infrastructure, while providing feedback loop pace and stem quality assurance to its interstitial space partners, the mesenchymal and end organ cells. Finally, its anti-inflammatory ricochet and wash-out effect backwashes the interstitial space and then spreads anti-inflammatory signaling momentum into the central circulation back through capillary cell outer membranes to produce an aggregate-systemic anti-inflammatory tsunami that involves all endothelia, end organs and their interstitial spaces.”  12

Martha Twaddle, MD, '88, '89 GME, received the Lifetime Achievement Award from the American Academy of Hospice and Palliative Medicine at their Annual assembly in Orlando,

Support the White Coat Tradition

Founders' Day celebrates the distinguished history of Northwestern University Feinberg School of Medicine and introduces students to the unique responsibilities that lay ahead for them as physicians. On this day, the white coat ceremony welcomes the incoming class to Feinberg and honors those who have come before. This fall, our first-year students will embark on their medical journeys and don their white coats for the first time.

Your involvement in this momentous occasion can change a student's world.

Make your gift to support a white coat this year at www.northwestern.edu/whitecoatfy19



Florida, in March 2019. Twaddle is on faculty at Feinberg, serving as medical director of Palliative Medicine & Supportive Care, as well as clinical associate professor of Medicine.

Mark Slaughter, MD, '91 GME, was recently named the Indiana University Medical Alumni of the Year. Slaughter is currently professor and chair in the Department of Cardiovascular and Thoracic Surgery at the University of Louisville.

📷 13

Brian Silverstein, MD, '00 GME, was recently appointed director of Strategy Practice for The Chartis Group, a leading provider of comprehensive advisory services to the healthcare industry. Silverstein most recently served as a senior vice president at CareFirst BlueCross BlueShield.

Veena Shankaran, MD, '09 GME, is the 2019 recipient of the Gold Award in Achievement in Medical Research, awarded by *Seattle Business Magazine*. Shankaran, a gastrointestinal medical oncologist, is also featured on the cover of the March 2019 issue.

Sangeetha Reddy, MD, '13 GME, '14 MS, received the Recruitment of First-Time, Tenure-Track Faculty Members Award, moving to the University of Texas Southwestern Medical Center from the University of Texas MD Anderson Cancer Center. She has published in *Nature Medicine*, and soon, she will publish a paper about the immunoprofiling of inflammatory breast cancer in Cancer Immunology Research. With her new \$2 million grant, she will develop novel immunotherapy treatments in breast cancer. 📷 14

PT

Jillian Stewart, '14 DPT, HPCS, is a hypnotherapy clinical specialist and the founder of Surf and Turf Therapy, an organization committed to bettering lives through alternative therapeutic activities, including surfing, climbing and hypnotherapy. She is currently developing best practice recommendations, coursework and clinical specialty standards in surf therapy with the support of the International Surf Therapy Organization. 📷 15



“IT IS AN HONOR TO BE NAMED THE PACIFIC RIM PROGRAM CHAIRMAN. I THINK THIS IS AN IDEAL PLATFORM TO ENGAGE THE PROSTHETICS-ORTHOTICS FIELD DURING A PIVOTAL TIME IN OUR PROFESSION.”

-J. CHAD DUNCAN, PHD, CPO, CRC '97, '99 CERT

Pepper Burruss, '77 BSPT, has retired after a 42-year NFL career, ending a 26-year tenure as head athletic trainer and physical therapist for the Green Bay Packers. Burruss joined Green Bay in 1993 following 16 seasons with the New York Jets as an assistant athletic trainer. 📷 16

Jim, '84 BSPT, and *Debbie Patrizi, '84 BSPT*, have both earned their post-professional Doctor of Physical Therapy degrees. Jim practices wound healing and edema management at the Veterans Administration in Martinez, California, and Debbie continues as the Pediatric Rehab Services Director at Kaiser Permanente in Oakland, California. Both serve as part-time faculty in the DPT program at Samuel Merritt University, and Jim also teaches at University of the Pacific. They are expecting their first grandchild in 2019.

J. Chad Duncan, PhD, CPO, CRC '97, '99 CERT, has been named program chair for the United States Member Society of the ISPO Pacific Rim (PacRim) Meeting in 2020. ISPO PacRim will meet January 17–23, 2020 in Lahaina, Hawaii. Duncan writes, “It is an honor to be named the PacRim program chairman. I think this is an ideal platform to engage the Prosthetics-Orthotics field during a pivotal time in our profession. For years, PacRim has been the go-to venue to experience new technology and learn from experts, while being surrounded by the beauty of Hawaii. This is a great place to make something amazing happen.”

Duncan is an associate professor of Physical Medicine and Rehabilitation at the Northwestern University Feinberg School of Medicine and was named director of the Northwestern University Prosthetics-Orthotics Center in January 2019.

Long-time Faculty Members Leave More Than \$9 Million to Northwestern

Much of their gift will support candidates and fellows studying lung disease.

David Cugell, MD, and Christina Enroth-Cugell, PhD, spent almost their entire careers at Northwestern University. The school's longest-serving faculty member, with a tenure of 58 years, Cugell was founding chair of the Division of Pulmonary and Critical Care Medicine at Feinberg.

During their lifetimes, the Cugells included the university in their estate plans, designating commitments to multiple areas. Upon their passing in 2016, Northwestern received planned gifts from the Cugells totaling \$9.39 million. More than \$4.39 million will support candidates and fellows at Feinberg studying lung disease.

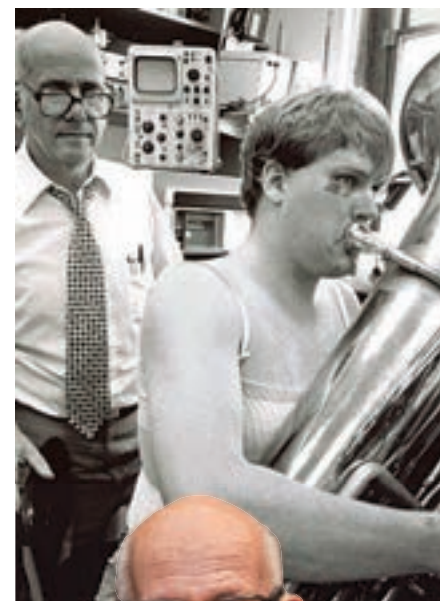
"Dave Cugell was strongly committed to the training of young physicians and scientists in the area of lung disease," says Scott Budinger, MD, chief of Pulmonary and Critical Care in the Department of Medicine and the Ernest S. Bazley Professor of Airway Diseases at Feinberg, who worked closely with Cugell on several projects toward the end of his career. "He would be pleased to know that the fellowships he has provided will help to bring a new generation to this area and will further knowledge to improve the lives of patients with lung disease."

The Cugells began their pioneering careers at Northwestern in 1955, the same year they were married.

Serving on the faculty for 31 years, Enroth-Cugell was one of the first female professors to teach at Northwestern's McCormick School of Engineering and chaired the Department of Neurobiology within the Weinberg College of Arts and Sciences.

The Cugells' most recent gifts contribute to **We Will. The Campaign for Northwestern**, helping realize the transformational vision set forth in Northwestern's strategic plan and solidify the university's position among the world's leading research universities.

In the 1980s, Cugell conducted a study on breathing patterns in wind instrumentalists.





Robert L. Sufit, MD (middle), professor of Neurology and Surgery at Feinberg, received the Harvey and Bonny Gaffen Advancements in ALS Award. Here, he poses with the Gaffens, two founders of the Les Turner ALS Foundation.

Celebrating Our Les Turner ALS Foundation Partner

Nearly 450 people, including 21 men and women living with amyotrophic lateral sclerosis (ALS), attended the Les Turner ALS Foundation's annual Hope Through Caring Gala on March 9. The event raised \$617,000 to support the Foundation's mission to provide the best quality of care, local community support and hope through scientific research to everyone affected by this disease.

"We are all here because we are part of the Les Turner ALS family: those of us with ALS, those of us who love or care for someone with ALS, those of us who advocate for people with ALS, those of us who provide clinical care and those of us who search for a cure for ALS," said Andrea Pauls Backman, chief executive officer of the Les Turner ALS Foundation.

This year, the Foundation honored Mindy Evans-Williams, a patient and donor diagnosed with ALS in 1992, with its Hope Through Caring Award, and Robert L. Sufit, MD, professor of Neurology and Surgery at Feinberg, with the inaugural Harvey and Bonny Gaffen Advancements in ALS Award.

A neurologist at the Les Turner ALS Center at Northwestern Medicine, Sufit has helped thousands of families affected by ALS through his clinical care and research since joining Northwestern in 1992. In fact, he designed and participated in some of the earliest and ongoing clinical drug trials in ALS and has published numerous papers on the natural history of ALS, end of life care for ALS patients, as well as the speech, swallowing and electrophysiology of the disease.

"The real heroes are the people with ALS and their families, who live with ALS and volunteer in our clinical trials. All of our work depends upon them," he said, to cheers from the audience — including whistles from one of his patients.

In 2014, the Les Turner ALS Foundation made a leadership commitment of \$10 million to help establish the Les Turner ALS Center at Northwestern Medicine. The Foundation continues to partner with Northwestern to raise \$10 million to endow the Center in perpetuity.

Malnati Brain Tumor Institute Moves To 20th Floor of Galter

On February 26, donors to the Northwestern Medicine Lou and Jean Malnati Brain Tumor Institute of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University at Northwestern Memorial Hospital gathered with clinical staff and administration to unveil a new state-of-the-art clinical space located on the 20th floor of Galter Pavilion at 675 N. St. Clair Street. The expanded space treats patients with malignant, benign and metastatic brain and spinal tumors.

The new naming of the institute began in late 2017 after a landmark donation was gifted by the Lou Malnati Cancer Research Foundation. The expanded clinical space is part of an overarching vision to provide better follow-up care by striving



for quicker diagnosis, more specialized treatment and one-of-a-kind support programs within the Lurie Cancer Center.

Triple in size from the original space, the newly constructed clinic space occupies 8,370 square feet of the floor, with 12 exam rooms and two consult areas. A majority of the rooms are designed to be hybrid exam rooms and consult rooms to allow for better utilization of space and to increase family involvement for members wishing to attend appointments.

Other amenities include a radiology reading room embedded into the clinic to review patients' medical images and an MRI scheduler in the clinic to provide patients a one-stop-shop for scheduling follow-up imaging return visits. An oversized, 140-square-foot exam room provides space for a ceiling-mounted patient lift for patients who are immobile.

Leadership from the Malnati Brain Tumor Institute, with members of the Malnati family at the opening of the institute's new clinical space. Jean Malnati Miller and Dean M. Harrison, president and CEO of Northwestern Memorial HealthCare, had the honor of cutting the symbolic ribbon.

Nupur Ghoshal, '01 PhD, '03 MD, and Kavitha Gandhi, '98 MD, '99 GME

LET'S TALK ABOUT WOMEN IN MEDICINE

A serendipitous encounter in the lobby of the Tarry building during alumni weekend last year between Nupur Ghoshal and Kavitha Gandhi began with pleasantries, but quickly dove into a deep conversation about their shared experiences as women in medicine.

Nupur was raised as a faculty brat in an enriched academic environment where her parents were supportive of her development as an academic neurologist. Even so, she rapidly encountered challenges and hurdles as a woman in her ascent within academic medicine. Though Kavitha was raised by a physician father and NCI scientist mother, who were supportive of her career as a clinical dermatologist, she, like many women physicians, has sought support from close friends and colleagues when navigating implicit bias as a female physician over the years.

The two, both members of Northwestern's Medical Alumni Association National Board, have partnered to advance the Board's Women in Medicine (WIM) strategic initiative and join other efforts at Northwestern to provide a larger support system for future alumni. They have been busy spreading the word.

Here, Ghoshal and Gandhi talk to *Northwestern Medicine* magazine about their nascent efforts to promote the WIM initiative.

WHY TALK ABOUT WOMEN IN MEDICINE NOW?

Although women made up about half of each of our medical school classes, the time is ripe, especially in the #MeToo era, to provide forums for discussion about how to help fill the gender gap in leadership. One forum we turn to often is social media (for us, the Women Neurologists Group and Physician Moms Group on Facebook have been great resources). But nothing beats real-life connections. We want to promote and connect alumni to conferences, symposia, and informal networking events, which allow women to gain skills for career and personal development in all stages of their careers, whatever (or however untraditional) those paths may be.

WHAT ROLE DOES NETWORKING PLAY IN A FEMALE PHYSICIAN'S CAREER?

Networking with other female physicians and learning how to cultivate mentoring relationships with allies of WIM is a powerful tool women need to succeed. We want to help bridge opportunities for alumni to engage in this important discussion locally and nationally, with thought leaders in the field who are doing valuable research and changing the landscape at institutions across the country.

HOW HAS NORTHWESTERN PROMOTED THIS IMPORTANT CONVERSATION?

We believe that Northwestern has welcomed initiatives to promote a platform for discussion. In October of last year, the Departments of Medicine and Surgery hosted the inaugural WIM Symposium, which was attended by my more than 200, including Dean Eric G. Neilson. Nationally recognized speakers and Feinberg faculty delivered evidence-based presentations on topics

UPCOMING EVENTS

• JUNE 12 CHICAGO

Northwestern's Women Physician Networking Event at MCA Chicago

• JULY 25-28 NEW YORK

American Medical Women's Association International Women's Conference

• SEPT 12-15 SCOTTSDALE


Brave Enough Conference

• SEPT 20-21 CHICAGO

Women in Medicine (WIM) Summit

• OCT 11 CHICAGO

Northwestern's Women in Medicine Symposium

 To learn more about upcoming events visit magazine.nm.org

including the current barriers for women physicians, physician wellness, negotiation skills, mentoring and coaching. The event was very well-received. We have rallied the Board to support the second (and hopefully annual) WIM Symposium, which will be held this October.

HOW ELSE CAN ALUMNI ENGAGE IN THIS EFFORT?

One way to participate is by attending the annual WIM tea at The Drake during alumni weekend. This past April, we had our third, which we organized and Nupur moderated — if you weren't able to make it, we hope to see you next year. In June, the Museum of Contemporary Art (MCA) Chicago will host the second Women Physicians Networking Event. And soon, we will be launching a closed Facebook page for female alumni — called Women in Medicine: Northwestern University Medical Alumni Association Group — providing a digital platform for exchanging ideas year-round. We invite you to join us in this conversation!



The American College of Physicians (ACP) has published a position paper on women in medicine, covering equity in physician compensation, career advancement, and bias. For more information, go to acponline.com.

LEFT TO RIGHT: NUPUR GHOSHAL AND KAVITHA GANDHI



1913

Radiology Pioneer

**JAMES T. CASE, MD,
BUILDS A NEW DEPARTMENT**

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

Northwestern's Department of Radiology dates back to 1913, when James T. Case, MD, was appointed the medical school's first professor and chair of the department, serving for more than 35 years (today, it is led by James Carr, MD, featured on page 26). Widely recognized as one of the leading radiologists of the early 20th century, Case published more than 100 papers in medical journals and made significant contributions to the field, particularly in diagnostic radiology of the gastrointestinal tract. Many noted that Case's insistence that radiology departments be a separate and distinct entity set a precedent, with many medical schools nationwide later following suit.

MORE ONLINE AT MAGAZINE.NM.ORG.

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