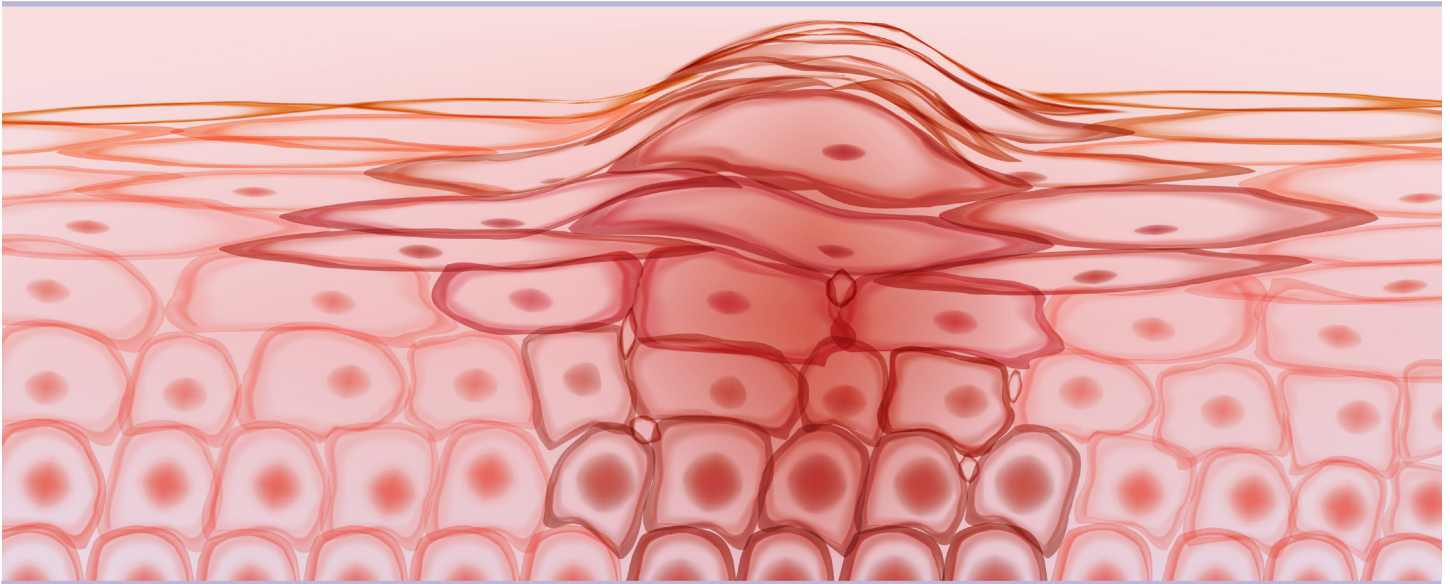


Breakthroughs

Feinberg School of Medicine Research Office

February 2020



An illustration of skin tissue
with melanoma

Skin Deep: The Skin Biology and Diseases Resource-Based Center

By Emily Ayshford

Our skin is often thought of as the ultimate barrier that protects us, but what happens when that barrier is compromised through disease, like eczema? What are the mechanisms behind these diseases, and how can the latest technologies be exploited for discovery and treatment?

These are the kinds of questions that the [Skin Biology and Diseases Resource-Based Center \(SBDRC\)](#) helps answer. One of only six such centers in the United States funded by the National Institutes of Health (NIH)'s National Institute of Arthritis and Musculoskeletal and Skin Diseases, the center promotes bench and clinical skin and epithelial biology research efforts across multiple disciplines at Northwestern and throughout the Chicago clinical research community. The center was originally established in 2009 with NIH funding and was just awarded another \$2.5 million direct award to continue skin disease research at its three cores through 2024.

The SBDRC “enables people to share their skills, develop expertise, and facilitate research,” says center director [Amy Paller, MD](#), the Walter J. Hamlin Professor and chair of the Department of [Dermatology](#), who oversees the center with Robert Lavker, PhD, associate center director and the Jack W. Graffin, MD, Research Professor of Dermatology. Started in 2009, the center now supports more than 70 faculty members in 14 departments at Northwestern, in addition to faculty at the affiliated Chicago Biomedical Consortium.



Amy Paller, MD, chair of the Department of Dermatology, oversees the center with Robert Lavker, PhD.

A wide range of tissues and 3D cultures

The center's **Skin Tissue Engineering and Morphology (STEM)** core offers cultures of normal human and mouse epidermal keratinocytes (the cells that make up the majority of the epidermis). Often this tissue comes from donated foreskin and skin from breast reductions and abdominoplasties, as well

(continued on page 2)

Skin Deep *(continued from cover page)*

as tissue of diseased skin collected from patients. The core maintains a diverse base of skin cell cultures and tissues — from different ages, genders and races — in order to best understand the biology of all human skin. The core can also generate a 3D culture of the cells that looks just like the epidermis. Because patient cells or engineered skin cells can be used, models of human disease can be tested.

[Kathleen Green, MD](#), the Joseph L. Mayberry, Sr., Professor of Pathology and Toxicology and professor of [Pathology](#) and Dermatology (who directs the core along with [Bethany Perez White, PhD](#), associate core director and assistant professor of Dermatology) often uses the core's services in her research. For example, her group is looking at how keratinocytes communicate with melanocytes, skin cells that produce melanin. "We want to know how this communication goes awry and how melanocytes transform into pre-melanoma cells," Green said. The core provides her with 3D cultures of melanocytes and keratinocytes in the same ratio that you would find in normal human skin. "The core facility really helps us accelerate our research," she said.

Cores offer in vivo testing, gene editing technology

The **Translational and Experimental Skin Testing and Immune Tracing (TEST IT)** core focuses on the relationship between keratinocytes and the skin immune system and provides instrumentation and immunological assay services. The core also has a unique clinical unit, where clinicians can test how exposure to environmental agents, like UV rays, affects skin immunologically and perform early testing of topical agents. Located near the dermatology clinics, the core also maintains a roster of healthy volunteers and individuals with skin disease who are willing to participate in IRB-approved experiments.

The **Gene Editing, Transduction and Nanotechnology (GET IN)** core allows investigators to use gene editing technology for skin research, including CRISPR/Cas9 technology and both viral



Robert Lavker, PhD, associate center director, with members of his lab.

and non-viral methods for the delivery of DNA, RNA and other biomolecules into skin. The core also has technology to deliver genes and proteins into single cells.

The skin is highly accessible, leading to an unparalleled opportunity for discovery. "We are encouraging clinicians who aren't investigators to partner with scientists to use the cores," Paller says. A clinician who has several patients with a particular skin disease that is poorly understood could partner with a scientist, and that clinician-scientist team can submit a clinical trial proposal, collect samples, work with the TEST IT core process material from the tissue, use the SBDRG or another institutional core to obtain data from that small piece of skin, and then work with the university's bioinformatics experts to understand the data. "It's a fantastic opportunity for translational research and engaging our clinicians with scientists," Paller said. "That discovery then comes back to the bedside."

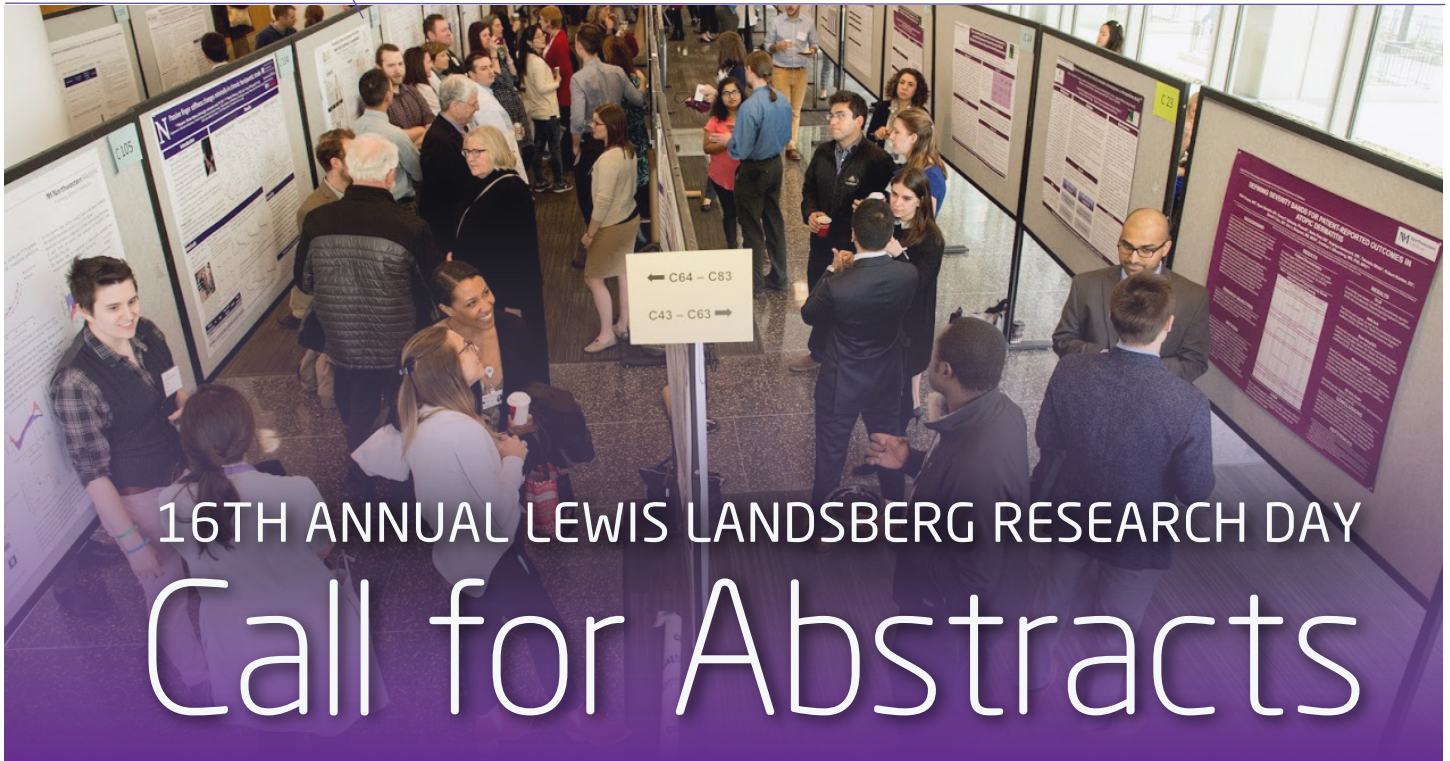
The center even gives out four \$25,000 grants each year to support pilot and feasibility studies across the university, most of which are awarded to scientists who are not already focused on skin disease research. During the past decade, these grants have been awarded for studies that have ranged from discovering biomarkers for activation of cutaneous itch neurons to examining skin cell mitochondria as a systemic oxygen sensor to topical delivery of nanoconstructs for gene regulation in skin — and have resulted in new federal grants and high-impact papers.

Several investigators who use the GET IN core are taking advantage of the generation of viruses for transduction or CRISPR/Cas9 technology at the SBDRG without having skin biology research as their main goal.

"We are open to brainstorming with people as to how we can collaborate using the cost-effective resources available at our center," Paller said. "One of our great successes has been leveraging the expertise at Northwestern toward skin biology and our field, but also providing new areas of interest and expansion for some of these great scientists who already conduct research involving skin or epithelial cells."

CONTENTS

Research Day	3
Aligning Research Priorities	4
Faculty Profile: Jaehyuk Choi, MD, PhD	5
Student Profile: Nathaniel Henning	6
Staff Profile: Victoria Wee/New Faculty	7
Research in the News and NUCATS Corner	8
Sponsored Research	9
Funding	10
Galter Library Connection	11
High-Impact Factor Research	12
Podcast and NIH News	13



16TH ANNUAL LEWIS LANDSBERG RESEARCH DAY Call for Abstracts

Submission Deadline

Thursday, March 5 at 11:59 p.m.

Research Day is Thursday, April 2 from 1 to 5 p.m. on the Chicago campus.

This event features a poster competition open to researchers in the following categories:

- Faculty
- Graduate students
- Undergraduate students
- MD-PhD students
- Medical students
- Postdoctoral researchers and fellows
- Clinical residents and fellows
- Research staff

Those interested in participating in the 2020 event must submit an abstract online no later than **11:59 p.m. on Thursday, March 5.**

[Submit an abstract here.](#)

Space is limited and will be assigned on a first-come, first-serve basis.

NEW DATE IN 2021: Please note that the 17th Annual Research Day will take place in October of 2021, rather than April.

For more information, please contact the Feinberg Research Office, 312-503-1499 or researchday@northwestern.edu

Researchers Align Interests with Northwestern Medicine to Maximize Success

At a recent Institute for Public Health and Medicine (IPHAM) forum Karl Bilimoria, MD, MS, vice president of Quality and Clinical Integration and Director of Health System Clinical Collaboratives, presented strategies to help researchers align their work with Northwestern Medicine priorities and areas of strategic focus — before proposals are submitted. IPHAM members have had a major impact on the overall growth in research awards at Feinberg, accounting for 34 percent of total research awards granted.

“I want to flip the research model: Instead of researchers like myself coming up with ideas to test in the health system, we need more researchers to understand where the health system’s priorities are, and then prospectively develop a research trajectory that advances those priorities,” said Bilimoria. “That would be amazing synergism for the health system and for Feinberg School of Medicine.”



At a recent Institute for Public Health and Medicine (IPHAM) forum, Karl Bilimoria, MD, MS, presented strategies to help researchers align their work with Northwestern Medicine priorities.

What is the NM Research Alignment Process?

To further open channels and align priorities between researchers and Northwestern Medicine, the Research Alignment Process has been developed. This process is facilitated by the Northwestern Medicine Office of Research and provides researchers with a key contact and a standardized process to engage Northwestern Medicine partners and resources for research efforts both pre- and post-award. Any researcher conducting their work at Northwestern Medicine and who meets the requirements should contact research@nm.org for more information and to initiate the process.

Research that meets at least one of the following requirements will be routed appropriately:

- Requires a new build and/or optimization in the electronic medical record (EMR) or related systems: **Health System Clinical Collaboratives (HSCCs)** will review requests in order to properly align with priorities of Northwestern Medicine
- Requires support from NM system functions such as Quality, Registries, Information Technology, Information Systems and/or Performance Improvement: The Office of Research will facilitate connections between researchers and appropriate contacts to received approval from leaders, letters of support and/or information to include in the research budget.

What are the HSCCs?

HSCCs are multidisciplinary, cross-regional groups that advance the safety, effectiveness and efficiency of patient care to support clinical integration. HSCCs are clinically focused, specialty-specific and physician-led. Members work together to prioritize requests and disseminate information to colleagues.

HSCC Membership Consists of the Following:

- **Clinical co-leaders:** One academic medical center representative and one regional physician, nurse or pharmacist
- **Three members from each hospital:** MD/DO, APPs, nurse/administrative leaders
- **System functions members:** Informatics, IT, Analytics, Quality, PI
- **Facilitator:** Designated administrator to organize HSCC meetings

HSCC Support Pre- and Post-Award:

All ideas must go through the relevant HSCC prior to grant submission, explains Dr. Bilimoria. Pre-award, during the planning and proposal stages, the goal is to review research requests to ensure they meet the following criteria: are aligned with NM priorities; are feasible; have been reviewed by appropriate clinical and administrative leadership; have buy-in from impacted clinicians; and include appropriate budgets to complete the work.

Post-award (which may be months to years later), the goal is to ensure that the research is still aligned with and approved by the relevant clinical and administrative leaders, impacted clinicians and health system leaders. The HSCC must also prioritize the work for the research against other existing priorities.

For an overview of current HSCCs, an example of a successful research alignment, and more resources for investigators, read a full article [here](#).

Uncovering the Mechanisms Behind Aggressive Skin Cancers

Jaehyuk Choi, MD, PhD, the Ruth K. Freinkel, MD, Research Professor and assistant professor of Dermatology and of Biochemistry and Molecular Genetics



[Jaehyuk Choi, MD, PhD](#), is the Ruth K. Freinkel, MD, Research Professor and assistant professor of [Dermatology](#) and [Biochemistry and Molecular Genetics](#). His lab employs innovative genomics and immunological approaches to identify the pathophysiology of aggressive skin cancers. By shedding light on the genetic and epigenetic mechanisms by which these cancers avoid the immune system, his goal is to improve the detection, staging and treatment of aggressive and metastatic skin cancers. He is a member of multiple institutes and centers at Feinberg, including the [Robert H. Lurie Comprehensive Cancer Center](#), the [Center for Genetic Medicine](#), the [Skin Biology and Diseases Resource-Based Center](#) and the [Simpson Querrey Center for Epigenetics](#).

Q&A

What are your research interests?

I am a physician scientist with a clinical and scientific focus on skin cancer. Currently, my [lab](#) employs cutting-edge approaches to elucidate the genetic and epigenetic mechanisms employed by cancer to proliferate and avoid the immune system.

What is the ultimate goal of your research?

The ultimate goal of our research is to improve care for patients I see in the clinic. My team and I believe that rigorous scientific investigation can lead to the discovery and the validation of clinically actionable biomarkers and novel therapeutic targets for aggressive skin cancers.

How did you become interested in this area of research?

In the clinic, I see patients with advanced cutaneous T cell lymphoma, Merkel cell carcinoma and melanoma. My research has always been inspired by my patients — ultimately, I do it for them.

How is your research funded?

Our research is funded by grants from the National Institutes of Health, grants from national non-profit organizations and gifts from patients.

Where have you recently published papers?

We have recently published manuscripts in [Nature Genetics](#), [Blood](#) and the [Journal of Investigative Dermatology](#).

Who inspires you? Who are your mentors?

I have been fortunate to have fantastic mentors over the years. These mentors include my high school chemistry teacher, multiple college and medical school professors and senior faculty at Northwestern. More than anything, they have given me the confidence to boldly tackle difficult scientific and medical problems. In appreciation of their efforts, I have been and will continue to try to pay it forward. Mentorship is an integral part of my job as a faculty member here at Feinberg.

Research Clinic Series: Ask an Economist

The Buehler Center for Health Policy & Economics is hosting **Ask an Economist**, a clinic designed to answer scientists' economic questions. The Center's talented faculty and their networks can answer questions on a variety of economic topics to help you make more informed choices about your research plans.

All Friday clinics take place in the Lake Shore Conference Room on the 9th floor of the Rubloff building at 420 E. Superior St. Register [here](#).

The Buehler Center offers support not only in economics, but also in the following areas:

Evaluation • Policy
Science/Anatomical Illustration
GIS Mapping • Demography

Research Clinic Dates:

Friday, February 21, 10 a.m. – 12 p.m.

Friday, March 13, 10 a.m. – 12 p.m.

Friday, April 10, 10 a.m. – 12 p.m.

Friday, May 8, 10 a.m. – 12 p.m.

Engineering Approaches for Regenerative Medicine

Nathaniel Henning, third-year student, Driskill Graduate Program in Life Sciences



Q&A

Where is your hometown?

I grew up in the frozen tundra of Saint Paul, Minnesota. I went to Hamline University, where I majored in biology and chemistry.

What are your research interests?

I work in the field of reproductive sciences — focused on ovarian biology — and I'm interested in how we can use tissue engineering

to solve problems in reproductive sciences such as premature ovarian insufficiency.

More specifically, I'm interested in developing informed engineering approaches for regenerative medicine by studying how the matrisome (extracellular matrix and associated proteins) and physical properties of organs modulate important biological processes, and how these properties can be leveraged to help resolve medical issues. Currently, I'm looking at these properties in the ovary, but I'm also interested in applying this in other organ systems.

What exciting projects are you working on?

In the lab we're working on developing the next generation of 3D printed ovarian bio-prosthetics. To do this, I've been examining the ovarian matrisome and physical properties of the ovary to take an informed engineering approach for bio-inks and scaffold design.

To define the matrisome, we developed a novel method for spatially mapping matrisome proteins on a whole organ-scale using a computational pipeline I developed in collaboration with Dr. Richard LeDuc. Using this approach, we were able to discover and map — in three dimensions — how matrisome proteins changed across depths of the ovary.

We just [published](#) a paper on this project in *Scientific Reports* that features maps of matrisome proteins in porcine ovaries. I am using this information to dissect the mechanistic relationships between differentially distributed matrisome proteins and follicle activation using an in situ culture system developed in the [Laronda Lab](#) [led by [Monica M. Laronda, PhD](#)], alongside developing (and testing) inks with 3D printed scaffolds.

We've also been looking at mapping mechanical properties of the ovary using AFM-based methods and looking at how differences in the physical environment can affect

folliculogenesis. We believe that we can use data from these two projects to create long-term ovarian bio-prosthetics suitable for use in humans. We also are looking to see if the techniques and experimental pipeline we've developed can be implemented in other organ systems.

What attracted you to your program?

When I first was looking at programs, I was looking for ones that were interdisciplinary, focused on translational research and strong in infectious disease research. Northwestern has these in spades, but during interviews I was most impressed by the culture of the institution. The professors I interviewed with stressed the collaborative and supportive culture of Northwestern, which very much appealed to me as I started my research career.

What has been your best experience at Feinberg?

Working with Dr. Laronda has been an impactful experience at Feinberg. I am her first graduate student and I have been able to have a hand in developing and executing a lot of the ongoing lab projects. I have had the opportunity to present at a variety of conferences and received a lot of great one-on-one mentorship and guidance on everything from writing manuscripts and grant applications to isolating follicles from tissue and seeding them into scaffolds.

How would you describe the faculty at Feinberg?

I think the faculty at Feinberg (and core facilities) are supportive and approachable. Professors are open to new ideas even if they may sound a little unfeasible at first, like spatially mapping the matrisome of a whole organ using proteomics, so long as scientifically the idea is sound. There's also a very collaborative and helpful atmosphere and I've reliably found professors very open to sharing their expertise to help with a project or provide a much-needed reagent.

What do you do in your free time?

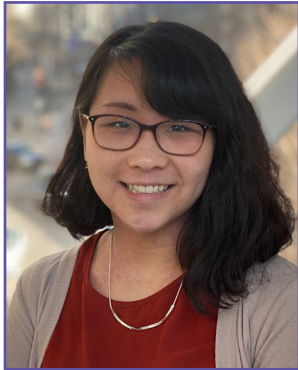
I think it's important to make room for activities outside of the lab, even though this can be challenging. When I am able to carve out some free time I tend to split it between cooking, reading, playing video games and painting models.

What are your plans for after graduation?

Since I'm into the later stages of my graduate education, I've been thinking about this quite a bit. Right now after graduate school, I'm hoping to continue doing research in reproductive sciences and/or regenerative medicine as a postdoc toward becoming an independent investigator.

Promoting Access to Mental Health Care

Victoria Wee, research assistant at the Asher Center for the Study & Treatment of Depressive Disorders in the Department of Psychiatry & Behavioral Sciences



Q&A

Where are you originally from?

My parents are immigrants from China and Taiwan, but I was born and raised in Chicago. I've lived in the same house my whole life, actually. It's definitely a city I can see myself moving back to after graduate school.

Please tell us about your professional background.

I studied psychology at Northwestern University and graduated in 2018. Throughout college, I was very involved in research, as well as student organizations that strived to normalize discussions of and promote access to mental health care. Since then I've been working as a research assistant at the Asher Center here on the Chicago campus. I'm currently in the process of applying to graduate school to study minority mental health, with a focus on Asian Americans.

What exciting projects are you working on?

For my post-baccalaureate research assistantships, I actively sought out projects that aimed to increase mental health care accessibility for diverse and socioeconomically disadvantaged populations. The primary project that I work on is the M-Body study, a randomized controlled trial led by [Dr. Inger Burnett-Zeigler](#) in [Psychiatry and Behavioral Sciences](#).

The study tests the effectiveness of a mindfulness-based intervention for African American adults with depressive symptoms at community health centers on the South

Side of Chicago. I'm also involved in COMPASS, a perinatal collaborative care program led by [Dr. Emily Miller](#) that provides universal access to comprehensive psychiatric care embedded within obstetric practices here. We recently presented a poster and are now working on a paper on racial and ethnic differences in mental health treatment plans among participants in COMPASS.

What is your favorite part of the job?

I love working with the participants. Because I attend all of the group sessions and because we do multiple follow-up visits, I often get to know them across the course of the study. Some of our participants may express stigmatized views and distrust toward traditional mental health services, but are receptive to and usually quite excited about participating in our intervention, where they have the chance to learn skills for managing life stressors and meet other women who are experiencing the same feelings.

Importantly, M-Body allows the opportunity to normalize discussions of mental health in a manner that participants find acceptable. This really demonstrated to me the power of community-based interventions and meeting people where they're at, and that's probably my favorite part of working on this study.

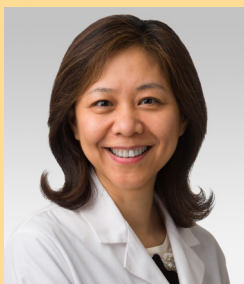
What do you like to do in your spare time?

My favorite activity is rock climbing — you'll often find me at one of the First Ascent gyms before or after work. I also enjoy baking, bullet journaling, playing the kalimba and trying different restaurants in Chicago.

Anything else we should know about you?

I'm always looking for more people to climb with, so if you see me at First Ascent feel free to come say hello!

Welcome New Faculty



[Yue Xue, MD, PhD](#), joins as associate professor of [Pathology](#). Previously, Xue held a faculty appointment at Emory University after completing a one-year gastrointestinal and liver pathology fellowship. She completed her residency training at Dartmouth-Hitchcock Medical Center and one-year oncologic surgical pathology fellowship training at Memorial Sloan-Kettering Cancer Center. She has published 26 original observations, written four reviews and four book chapters, and has been actively involved in pancreatobiliary/liver research, studying the clinicopathologic features of neoplasm including pancreas and ampulla of vater, to investigate the molecular pathways involved in the pathogenesis of these cancers, and to identify both diagnostic and theranostic markers for more effective treatment of these cancers.

Research in the News

NUCATS Corner
Clinical and Translational Sciences Institute



The New York Times, January 1

[A.I. is Learning to Read Mammograms](#)

Mozziyar Etemadi, MD, PhD, was quoted.

NBC, January 5

[9 science-backed wellness trends from the last decade that we're taking into the 2020s](#)

Phyllis Zee, MD, PhD, was quoted.

Reuters, January 6

[Many young women get unnecessary pelvic exams](#)

Melissa Simon, MD, MPH, was quoted.

The Washington Post, January 6

[I quit drinking 2 years ago. Over time, my brain made it easier](#)

Richard Miller, PhD, was quoted.

Reuters, January 8

[Rural seniors sent to aftercare have higher mortality than urban peers](#)

June McKoy, MD, JD, MBA, was quoted.

Today, January 13

[Hormone therapy for menopause: What are the benefits of taking estrogen?](#)

Lauren Streicher, MD, was featured.

U.S. News & World Report, January 13

[Which Teens View Vaping as a Health Threat? Survey Offers Clues](#)

Thanh-Huyen Vu, MD, PhD, was featured.

A Meeting Un-like Any Other

Sometimes rules aren't made to be broken, they're made to be forgotten.

The NUCATS Institute will welcome more than 100 clinical and translational scientists and research staff members from across the national Clinical and Translational Science Award (CTSA) Consortium to Chicago on March 2 for an Un-Meeting focused on Lifespan and Life Course Research Strategies.

So, what's an Un-Meeting? The concept is steeped in simplicity. The format is without the governance or structure of a traditional symposium, providing opportunities for attendees to focus on what matters most to them. Participants do this by driving the agenda, steering the resulting discussions and working in multidisciplinary teams to develop innovative solutions.

Additional details about the March 2 Un-Meeting, which is supported in part by the University of Rochester Center for Leading Innovation and Collaboration, are available [here](#).

BREAKOUT:

CTSA Un-Meeting
Monday, March 2, 2020
8 a.m. to 4 p.m.
Northwestern Medicine Prentice Women's Hospital

Need Recruitment and Retention Help with a Multisite Study?

The NUCATS Trial Innovation Network (TIN) liaison program [connects](#) Northwestern investigators conducting multisite clinical studies with the national TIN network.

As part of the TIN, the Recruitment Innovation Center (RIC) not only supports recruitment and retention at the earliest stages of a study, but it also provides support to address ongoing recruitment and retention challenges.

With specialist expertise in informatics and the science of engagement, RIC staff work with researchers to develop, test and share innovations in order to improve participant recruitment and retention and in doing so, improve health outcomes.

Please email the NUCATS TIN [liaison team](#) to connect with the RIC.

Sponsored Research

PI: Mehul V. Raval, MD, MS, associate professor of Surgery in the Division of Pediatric Surgery and of Pediatrics, director of the Pediatric Surgery Research Scholars Program, faculty PI in the Surgical Outcomes and Quality Improvement Center



Sponsor: National Institute of Child Health and Human Development

Title: Clinical Trial of Enhancing Recovery in Children Undergoing Surgery – ENRICH-US

Initiated in the 1990s, perioperative Enhanced Recovery Protocols (ERPs) have progressively gained traction in a wide range of adult surgical disciplines and resulted in decreased hospital length of stay (LOS), in-hospital costs, complications, and markedly improved patient care experience that mitigates the physiologic stress of surgery and hastens recovery. However, it is estimated that it takes nearly 20 years for evidence to make its way into clinical practice, and failure rates for implementing complex innovations range from 30 percent to 90 percent. Implementation of ERPs in pediatric surgery is lagging and concerted efforts to demonstrate both clinical effectiveness and to examine obstacles to implementation are needed. Specifically, pediatric patients with inflammatory bowel disease (IBD) undergoing elective abdominal surgery represent an ideal population in which to study the implementation of ERPs.

Almost one third of patients with Crohn's disease (CD) and a quarter of patients with Ulcerative Colitis (UC) present before age 20. Up to three-quarters of CD patients require GI surgery for medically refractory disease and all patients with UC require colectomy to either manage severe disease or to mitigate cancer risks. Over the past four years, our study team modified existing adult ERPs to meet the needs of pediatric patients undergoing elective GI surgery. Based on the positive results of a pilot study, we propose to conduct a multicenter, prospective, pragmatic study using a stepped-wedge, cluster, randomized controlled trial design to evaluate the effectiveness of ERPs while assessing implementation fidelity, sustainability and site-specific adaptations. Read [more](#).

PI: Teresa K Woodruff, PhD, associate provost for Graduate Education, Dean of The Graduate School, vice chair for Research, Department of Obstetrics and Gynecology, director, Women's Health Research Institute, chief of Reproductive Biology Research in the Department of Obstetrics and Gynecology



Sponsor: National Institute of Environmental Health Sciences

Title: PCOS and Androgen-Related Disease Modeling and Drug Testing in Multi-Organ Integrated Microfluidic Reproductive Platform

Microfluidic systems have been developed that support 28-day reproductive cycles including ovarian follicle growth, ovulation and luteinization with the accompanying changes in estradiol and progesterone. The oocytes that are released from the follicle in this setting are healthy and have the predicted nuclear and cytoplasmic maturation phenotypes of in vivo ovulated oocytes. We have integrated the ovarian tissue and cycling hormone profiles into a multiplexed microdynamic unit that includes human fallopian tube tissue, uterine endometrium, cervix and liver organoids. We have also adapted mouse islets and separately, human testis and prostate into similarly bioactive systems. The purpose of this application is to further our work by implementing a next generation microfluidic system that has been created for the express purpose of a high throughput robotics setting that will enable drug testing of integrated organ systems that mimic a variety of reproductive diseases.

The hypothesis that will be tested is that we can create an in vitro microfluidic system that represents hallmarks of polycystic ovary syndrome, a multi-organ disease that affects eight to ten percent of reproductive-age women and for whom there is no adequate in vitro model. [Read more](#).

Lack of Funding for Disparities Research and Underrepresented Minority Scientists

Despite recent NIH findings that health disparities research and underrepresented minority scientists lack significant federal funding, the scientific community "has not embraced the message," according to a recent editorial co-written by Feinberg investigators [Mercedes Carnethon, PhD](#), [Kiarri Kershaw, PhD, MPH](#), and [Namratha Kandula, MD, MPH](#) and published in the *Journal of the American Medical Association*.

"The latest findings should spur funding agencies to make greater investments in funding and review processes that are structured to maximize representation of health disparities scientists from underrepresented backgrounds," the authors wrote. "Only by doing so will the NIH promote scientific innovation in a manner that can eliminate disparities and promote health equity around the world." Read a Q&A with the authors [here](#).

Funding

Autism Research Initiative - Collaboration on Sex Differences in Autism

[More information](#)

Sponsor: Simons Foundation

Submission deadline: April 21

Upper amount: \$8,000,000 over four years

Synopsis: Simons Foundation Autism Research Initiative welcomes proposals that will use an array of modern technologies to examine sex differences in brain function, within and across species, including humans, to identify key differences in gene, cell and circuit function that account for the observed differential sensitivities of the two sexes to autism spectrum disorder. A successful collaboration must enhance our understanding of the biological bases for sex-specific differences in ASD and set the stage for development of novel interventions.

Urology Centers Program Interactions Core (U24 Clinical Trial Not Allowed)

[More Information](#)

Sponsor: National Institute of Diabetes and Digestive and Kidney Diseases

Submission deadline: March 31

Upper amount: \$750,000

Synopsis: The George M. O'Brien Urology Research Centers and Exploratory Centers (U54) for Interdisciplinary Research in Benign Urology (P20) serve to advance the NIDDK's mission to support highly meritorious, innovative, interdisciplinary research in benign urologic diseases and disorders, and the training of the next generation of researchers. Critical to these broad goals is the ability to promote productive interactions between the U54 and P20 Centers, the institutional career development programs (K12), and the broader urology research and clinical communities.

Imaging Biomarkers to Track Disease Progression and Therapeutic Efficacy

[More information](#)

Sponsor: Michael J. Fox Foundation for Parkinson's Research

Submission deadline: April 19

Upper Amount: Up to \$750,000

Synopsis: Grants will support the development of imaging markers for use in disease-modifying clinical trials. Projects

should aim to develop novel imaging biomarkers as opposed to prospectively collecting data using existing technologies. Prospective data collection is appropriate only if a novel imaging technique or tracer is being tested. Novel data analysis techniques may be proposed but should utilize existing data sets.

Development and Integration of Novel Components for Open and Closed Loop Hormone Replacement Platforms for T1D Therapy

[More information](#)

Sponsor: Department of Health and Human Services and National Institutes of Health

Submission deadline: April 7

Upper Amount: \$500,000

Synopsis: This an opportunity for original research addressing barriers that limit progress toward effective open- and closed-loop glucose control systems.

Proposed research should tackle important obstacles at the level of sensing, hormone formulation and delivery, self-management decision support systems, and/or design of automated controllers/algorithms able to manage an integrated platform. This research may contribute to development of affordable and user-friendly technologies to improve glucose control in patients with Type 1 diabetes.

Developmental Mechanisms of Human Structural Birth Defects

[More information](#)

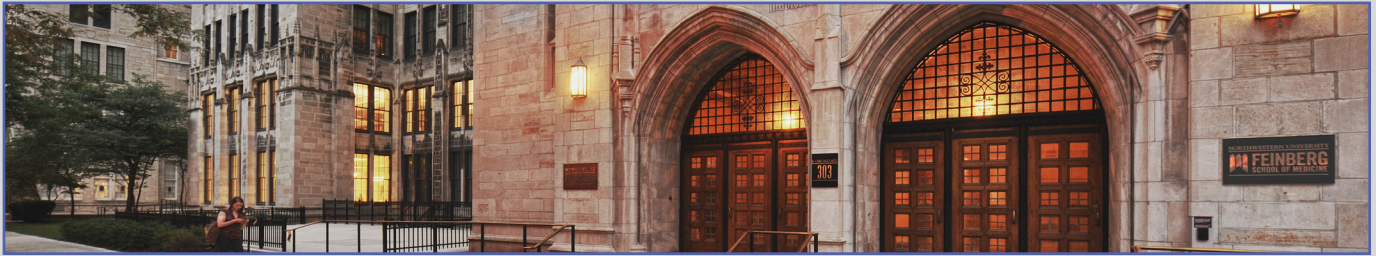
Sponsor: National Institutes of Health and Eunice Kennedy Shriver National Institute of Child Health and Human Development

Submission deadline: March 31

Upper Amount: \$3,000,000 in 2021 to fund up to three awards.

Synopsis: The purpose of this funding opportunity announcement is to support innovative, multidisciplinary, interactive, and synergistic program projects that integrate basic, translational, and clinical approaches to understanding the developmental biology and genetic basis of significant congenital human malformations. To contain costs, each program project will consist of only three component research projects, as well as associated cores. At least one project must use basic research in an animal model system and at least one project must be clinical or translational in nature.

2019 Clarivate Analytics Highly Cited Researchers and Altmetric's Top 100 List



By Karen Gutzman, Head, Research Assessment and Communications Librarian

Highly Cited Feinberg Investigators for 2019

Each year, Clarivate Analytics releases a list of highly cited researchers, selected for their “exceptional research performance, demonstrated by production of multiple highly cited papers” that were published in 2008-2018 and at the end of 2018, ranked in the top 1% by citations for field and year in Web of Science. The threshold number of highly cited papers for selection differs by field, with Clinical Medicine requiring the most citations. There were 6,216 researchers named Highly Cited Researchers in the 2019 report.

Below is a list of Feinberg faculty who made the list in 2019, their appointment at Feinberg and the Web of Science Category in which they were identified. Congratulations!

Web of Science Highly Cited Feinberg Faculty

Category	Faculty Member
Chemistry	Chad Mirkin, PhD, Medicine (Hematology and Oncology)
Clinical Medicine	Clyde W. Yancy, MD, Medicine (Cardiology)
Clinical Medicine	Donald M. Lloyd-Jones, MD, Preventive Medicine
Clinical Medicine	Jeffrey A. Sosman, MD, Medicine (Hematology and Oncology)
Clinical Medicine	Robert O. Bonow, MD, Medicine (Cardiology)
Clinical Medicine	Mihai Gheorghiu, MD, Medicine & Surgery
Materials Science	John A. Rogers, PhD, Neurological Surgery
Materials Science	Mark C. Hersam, PhD, Medicine (Pulmonary and Critical Care)
Social Sciences	David Cella, PhD, Medical Social Sciences
Cross-Field	Navdeep S. Chandel, PhD, Medicine (Pulmonary and Critical Care)
Cross-Field	Samuel I. Stupp, PhD, Medicine (Endocrinology)

Please note that faculty may have more than one appointment at Northwestern. The full report on Highly Cited Researchers for 2019 can be found [here](#).

Altmetric Top 100 List for 2019

While bibliometrics such as number of citations highlight academic interest in a paper, it can take two to three years after a paper has been published for citations to begin accruing. Altmetrics track the attention, activity and engagement with your research on the web in real time through mass media coverage, citations in policy documents, social media mentions, reviews on F1000 and many other outlets.

Each year, Altmetric.com produces The Altmetric Top 100, an annual list of the research that has most captured the public's imagination each year. Below is one paper from Feinberg that made the list in 2019.

Title: Associations of Dietary Cholesterol or Egg Consumption With Incident Cardiovascular Disease and Mortality

Published in: JAMA

Feinberg Authors: Victor, W. Zhong, Linda Van Horn, Marilyn C. Cornelis, John T. Wilkins, Hongyan Ning, Mercedes R. Carnethon, Philip Greenland, Lihui Zhao, Donald M. Lloyd-Jones, Norrina B. Allen

This paper was published in March 2019 and has generated 380 news stories, 2,361 tweets, 26 blog posts, and has two reviews in F1000 prime. The paper ranks in the top 5% of research outputs ever tracked by Altmetric.com.

The entire list of the Altmetric Top 100 for 2019 can be found [here](#):

Learn More

The Metrics and Impact Core housed in Galter Health Sciences Library can help you track your work and learn more about metrics.

Please contact [Karen Gutzman](#) (karen.gutzman@northwestern.edu) or [Mao Soulakis](#) (mao.soulakis@northwestern.edu) to learn more about using metrics to tell your science story.

High-Impact Factor Research

Burbulla LF, Jeon S, Zheng JB, Song PP, Silverman RB, Krainc D. [A modulator of wild-type glucocerebrosidase improves pathogenic phenotypes in dopaminergic neuronal models of Parkinson's disease.](#) *Science Translational Medicine.* 2019 Oct;11(514):11.

Clark DW, Okada Y, Moore KHS, et al. (including **Cornelis M**). [Associations of autozygosity with a broad range of human phenotypes.](#) *Nat Communications.* 2019 Oct 31;10(1):4957.

Dix DB, Fernandez CV, Chi YY, Mullen EA, Geller JI, Gratijs EJ, Khanna G, **Kalapurakal JA**, Perlman EJ, Seibel NL, Ehrlich PF, Malogolowkin M, Anderson J, Gastier-Foster J, Shamberger RC, Kim Y, Grundy PE, Dome JS. [Augmentation of Therapy for Combined Loss of Heterozygosity 1p and 16q in Favorable Histology Wilms Tumor: A Children's Oncology Group AREN0532 and AREN0533 Study Report.](#) *Journal of Clinical Oncology.* 2019 Oct 20;37(30):2769-2777.

Ghosal D, Kim KW, **Zheng H**, Kaplan M, **Truchan HK, Lopez AE, McIntire IE, Vogel JP, Cianciotto NP**, Jensen GJ [In vivo structure of the Legionella type II secretion system by electron cryotomography.](#) *Nature Microbiology.* 2019 Dec; 4(12): 2101-2108.

Giuliano M, Schettini F, Rognoni C, Milani M, Jerusalem G, Bachelot T, De Laurentis M, Thomas G, De Placido P, Arpino G, De Placido S, **Cristofanilli M**, Giordano A, Puglisi F, Pistilli B, Prat A, Del Mastro L, Venturini S, Generali D. [Endocrine treatment versus chemotherapy in postmenopausal women with hormone receptor-positive, HER2-negative, metastatic breast cancer: a systematic review and network meta-analysis.](#) *Lancet Oncology.* 2019 Oct;20(10):1360-1369.

Henrichs J, Verfaillie V, Jellema P, Viester L, Pajkrt E, Wilschut J, van der Horst HE, Franx A, de Jonge A, van Baar AL, Bais JMJ, Bonsel GJ, Bosmans JE, van Dillen J, van Duijnhoven NTL, **Grobman WA**, Groen H, Hukkelhoven C, Klomp T, Kok M, de Kroon ML, Kruijt M, Kwee A, Ledda S, Lafeber HN, van Lith JMM, Mol B, Molewijk B, Nieuwenhuijze M, Oei G, Oudejans C, Paarlberg KM, Papageorghiou AT, Reddy UM, De Reu P, Rijnders M, de Roon-Immerzeel A, Scheele C, Scherjon SA, Snijders R, Spaanderman ME, Teunissen PW, Torij HW, Vrijkotte TG, Westerneng M, Zeeman KC, Zhang JJ, Grp IS. [Effectiveness of routine third trimester ultrasonography to reduce adverse perinatal outcomes in low risk pregnancy \(the IRIS study\): nationwide, pragmatic, multicentre, stepped wedge cluster randomised trial.](#) *BMJ-British Medical Journal.* 2019 Oct;367:13.

Hu YY, Ellis RJ, Hewitt DB, **Yang AD, Cheung EO, Moskowitz JT**, Potts JR, 3rd, Buyske J, **Hoyt DB**, Nasca TJ, **Bilimoria KY.** [Discrimination, Abuse, Harassment, and Burnout in Surgical Residency Training.](#) *New England Journal of Medicine.* 2019 Oct 31;381(18):1741-1752.

Kaufmann T, van der Meer D, Doan NT, Schwarz E, Lund MJ, Agartz I, Alnaes D, Barch DM, Baur-Streubel R, Bertolino A, Bettella F, Beyer MK, Boen E, Borgwardt S, Brandt CL, Buitelaar J, Celius EG, Cervenka S, Conzelmann A, Cordova-Palomera A, Dale AM, de Quervain DJF, Carlo P, Djurovic S, Dorum ES, Eisenacher S, Elvsashagen T, Espeseth T, Fatouros-Bergman H, Flyckt L, Franke B, Frei O, Haatveit B, Haberg AK, Harbo HF, Hartman CA, Heslenfeld D, Hoekstra PJ, Hogestol EA, Jernigan TL, Jonassen R, Jonsson EG, Kirsch P, Kloszewska I, Kolskar KK, Landro NI, Hellard S, Lesch KP, Lovestone S, Lundervold A, Lundervold AJ, Maglanoc LA, Malt UF, Mecocci P, Melle I, Meyer-Lindenberg A, Moberget T, Norbom LB, Nordvik JE, Nyberg L, Oosterlaan J, Papalino M, Papassotiropoulos A, Pauli P, Pergola G, Persson K, Richard G, Rokicki J, Sanders AM, Selbaek G, Shadrin AA, Smeland OB, Soininen H, Sowa P, Steen VM, Tsolaki M, Ulrichsen KM, Vellas B, **Wang L**, Westman E, Ziegler GC, Zink M, Andreassen OA, Westlye LT. [Common brain disorders are associated with heritable patterns of apparent aging of the brain.](#) *Nature Neuroscience.* 2019 Oct;22(10):1617-1623.

Kim J, Hu C, Moufawad El Achkar C, Black LE, Douville J, Larson A, Pendergast MK, Goldkind SF, Lee EA, Kuniholm A, Soucy A, Vaze J, **Belur NR, Fredriksen K, Stojkowska I**, Tsytsykova A, Armant M, DiDonato RL, Choi J, Cornelissen L, Pereira LM, Augustine EF, Genetti CA, Dies K, Barton B, Williams L, Goodlett BD, Riley BL, Pasternak A, Berry ER, Pflock KA, Chu S, Reed C, Tyndall K, Agrawal PB, Beggs AH, Grant PE, Urion DK, Snyder RO, Waisbren SE, Poduri A, Park PJ, Patterson A, Biffi A, **Mazzulli JR**, Bodamer O, Berde CB, Yu TW. [Patient-Customized Oligonucleotide Therapy for a Rare Genetic Disease.](#) *New England Journal of Medicine.* 2019 Oct 24;381(17):1644-1652.

Manski CF, **Tambur AR**, Gmeiner M. [Predicting kidney transplant outcomes with partial knowledge of HLA mismatch.](#) *Proceedings of the National Academy of Sciences of the United States of America.* 2019 Oct 8;116(41):20339-20345.

Nam KW, Park SS, Dos Reis R, Dravid VP, Kim H, **Mirkin CA**, Stoddart JF. [Conductive 2D metal-organic framework for high-performance cathodes in aqueous rechargeable zinc batteries.](#) *Nat Communications.* 2019 Oct 30;10(1):4948.

Nassif ME, Windsor SL, Tang F, Khariton Y, Husain M, Inzucchi SE, McGuire DK, Pitt B, Scirica BM, Austin B, Drazner MH, Fong MW, Givertz MM, Gordon RA, Jermyn R, Katz SD, Lamba S, Lanfear DE, LaRue SJ, Lindenfeld J, Malone M, Margulies K, Mentz RJ, **Mutharasan RK**, Pursley M, Umpierrez G, Kosiborod M. [Dapagliflozin Effects on Biomarkers, Symptoms, and Functional Status in Patients With Heart Failure With Reduced Ejection Fraction: The DEFINE-HF Trial.](#) *Circulation.* 2019 Oct 29;140(18):1463-1476.

Phan HP, Zhong Y, Nguyen TK, Park Y, Dinh T, Song E, Vadivelu RK, Masud MK, Li J, Shiddiky MJA, Dao D, Yamauchi Y, **Rogers JA**, Nguyen NT. [Long-Lived, Transferred Crystalline Silicon Carbide Nanomembranes for Implantable Flexible Electronics.](#) *ACS Nano.* 2019 Oct 22;13(10):11572-11581.

Ramachandran K, Senagolage MD, Sommars MA, Futtner CR, Omura Y, Allred AL, Barish GD. [Dynamic enhancers control skeletal muscle identity and reprogramming.](#) *PLoS Biology.* 2019 Oct;17(10):e3000467.

Solomon SD, McMurray JJV, Anand IS, Ge J, Lam CSP, Maggioni AP, Martinez F, Packer M, Pfeffer MA, Pieske B, Redfield MM, Rouleau JL, van Veldhuisen DJ, Zannad F, Zile MR, Desai AS, Claggett B, Jhund PS, Boytsov SA, Comin-Colet J, Cleland J, Dungen HD, Goncalvesova E, Katova T, Kerr Saraiva JF, Lelonek M, Merkely B, Senni M, **Shah SJ**, Zhou J, Rizkala AR, Gong J, Shi VC, Lefkowitz MP. [Angiotensin-Nepriylisin Inhibition in Heart Failure with Preserved Ejection Fraction.](#) *New England Journal of Medicine.* 2019 Oct 24;381(17):1609-1620.

Walker DA, Hedrick JL, **Mirkin CA.** [Rapid, large-volume, thermally controlled 3D printing using a mobile liquid interface.](#) *Science.* 2019 Oct;366(6463):360.

Won SM, Wang H, Kim BH, Lee K, Jang H, Kwon K, Han M, Crawford KE, Li H, Lee Y, Yuan X, Kim SB, Oh YS, Jang WJ, Lee JY, Han S, Kim J, Wang X, Xie Z, Zhang Y, Huang Y, **Rogers JA.** [Multimodal Sensing with a Three-Dimensional Piezoresistive Structure.](#) *ACS Nano.* 2019 Oct 22;13(10):10972-10979.

Zhang Y, Castro DC, Han Y, Wu YX, Guo HX, Weng ZY, Xue YG, Austra J, Wang XJ, Li R, Wu GF, Vazquez-Guardado A, Xie YW, Xie ZQ, Ostojich D, Peng DS, Sun RJ, Wang BB, Yu Y, Leshock JP, Qu SB, Su CJ, Shen W, Hang T, Banks A, Huang YG, Radulovic J, Gutruf P, Bruchas MR, **Rogers JA.** [Battery-free, lightweight, injectable microsystem for in vivo wireless pharmacology and optogenetics.](#) *Proceedings of the National Academy of Sciences of the United States of America.* 2019 Oct;116(43):21427-21437.

Earn CME credits for Listening to the Breakthroughs Podcast

Did you know that you can claim Continuing Medical Education (CME) credit for listening to the *Breakthroughs* podcast?

At Feinberg, we are driven by our mission to impact human health beyond the individual patient. We believe better answers come from discovery. *Breakthroughs* aims to broadcast these discoveries to contribute to the larger conversation surrounding human health.

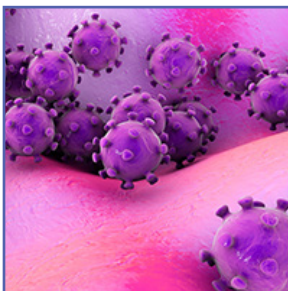
Each episode includes an interview with a Feinberg faculty member about their work and its impact. Featured experts and topics intersect all our medical disciplines at Feinberg – [dermatology](#), [ophthalmology](#), [nephrology](#) or wherever else your area of interest lies.

After listening to an episode, you will be able to identify the research interests and initiatives of Feinberg faculty and discuss updates in clinical and translational research. If you would like to claim CME credit for listening to *Breakthroughs*, visit the [Continuing Medical Education website](#).

The Northwestern University Feinberg School of Medicine is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. The Northwestern University Feinberg School of Medicine designates this Enduring Material for a maximum of 0.5 AMA PRA Category 1 Credit(s)[™]. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

If you have additional questions about processing CME credits, please [contact](#) the Office of Continuing Medical Education.

2020 Season Premiere of Breakthroughs Podcast



[Investigating the New Coronavirus with Karla Satchell, PhD](#)

Follow Feinberg Social Media



NIH News

Efforts to End Sexual Harassment in Science

NIH has developed a means for individuals working on NIH-funded projects who believe their rights to a safe working environment have been violated to contact NIH directly. Information can be found on the [NIH Anti-Sexual Harassment](#) and [For NIH Awardee Organizations](#) websites. NIH has established and will soon publicize clear agency-standard operating procedures that outline the steps NIH takes when a grantee institution or an individual at a grantee institution notifies NIH.

Additionally, NIH has established a [Working Group on Changing the Culture to End Sexual Harassment](#) as part of the [Advisory Committee to the Director](#) (ACD).

New NIH “FORMS-F” Coming Soon

Changes are coming to grant application form and application guide instructions with due dates of May 25, 2020 and beyond. The following application forms include substantive changes (such as new, deleted and modified fields). All other forms include only an Office of Management and Budget (OMB) expiration date change.

- PHS 398 Career Development Award Supplemental Form
- PHS 398 Cover Page Supplement
- PHS Assignment Request form
- PHS Fellowship Supplemental Form
- PHS Human Subjects and Clinical Trials Information
- SBIR/STTR Information

See [High-level Summary of Form Changes in FORMS-F Application Packages](#) for a full list of form changes. NIH will notify the community if it determines that additional changes are needed.

Celebrating 20 Years of ClinicalTrials.gov

As [ClinicalTrials.gov](#) celebrates its 20th anniversary on February 29, 2020, NIH is recognizing the world's largest public clinical research registry and results database, giving patients, families, healthcare providers, researchers and others easy access to information on clinical studies relating to a wide range of diseases and conditions. The National Library of Medicine (NLM) has launched an effort to [modernize ClinicalTrials.gov](#) to deliver an improved user experience on an updated platform that will accommodate growth and enhance efficiency. To obtain timely, detailed, and actionable input, NLM has issued a [Request for Information \(RFI\)](#) to solicit comments on the following topics: website functionality, information submission processes and use of data standards..