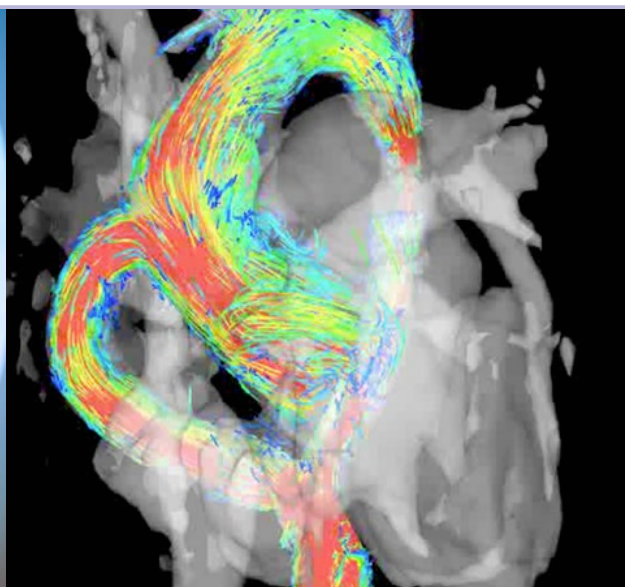


# Breakthroughs

Feinberg School of Medicine Research Office

May 2019



## Innovations in Radiology

By Will Doss

As a student at the Royal College of Surgeons in Dublin, Ireland, there was a single thought on the mind of [James Carr, MD, '00 '01 GME](#), chair and the Drs. Frederick John Bradd and William Kennedy Memorial Professor of [Radiology](#). “Because my father was a radiologist, I thought I was going to stay well clear of radiology,” said Carr.

He nearly pursued cardiology, but in the end, followed in his father’s footsteps, completing a radiology residency program at Saint Vincent’s Hospital (also in Dublin). Still, he held fast to his interest in the heart, 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,” said 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 to translate discoveries from bench to bedside.

“If you don’t have the interdisciplinary framework, the enterprise falls apart pretty quickly,” Carr said.

### Translational Teamwork

Before a new imaging modality makes it to the clinic, physicists and clinicians must engage in an iterative process of optimization. What’s technologically possible may not be useful in the clinic, and functionality desired by doctors may be impossible for physicists and computer scientists to implement — requiring a continuous dialogue between MDs and PhDs,

## Radiology *(continued from cover page)*

according to [Michael Markl, PhD](#), vice chair for research and the Lester B. and Frances T. Knight Professor of Cardiac Imaging in the Department of Radiology.

“You need the physics, engineering and computer science background, but it needs to be tied to the expectations and experiences of clinicians,” said Markl, who’s also a professor of Biomedical Engineering at the McCormick School of Engineering.

Feinberg has utilized this model to bring new imaging modalities and techniques to the clinic, such as a 4D flow MRI used to assess how blood flow is altered by congenital heart defects. Each individual’s heart has one-of-a-kind abnormalities, so understanding exactly how blood flows is invaluable for determining the course of care.

A decade ago, the scanning protocol for 4D flow MRI was long and arduous: The technique could only measure flow in a very small area of the heart, so it required a handful of different scans, each with its own precise patient positioning. Now, it requires just one scan, and much of the processing has been shifted after the scan — a big help for acquiring images from patients, particularly children, Markl explained.

“It helps to shorten scan time, because the child is often sedated or under general anesthesia because young children generally cannot tolerate MRI scans very well,” he said.

In addition, the processing and analysis step has been refined by Northwestern scientists. While a scan like an X-ray often produces just a handful of images, a single 4D flow MRI exam generates up to 10,000 images — many more than any radiologist can read in a reasonable amount of time. Northwestern scientists have built software to visualize that information, extracting numbers and parameters that are clinically relevant, Markl said.

Today, this exam is used weekly at the Ann & Robert H. Lurie Children’s Hospital of Chicago and Northwestern Memorial

Hospital, a testament to the translational workflow that runs through every research project in the Department of Radiology.

“We have excellent partners in neurology, psychiatry, cardiac surgery, cardiology, Northwestern Memorial and Lurie Children’s,” Markl said. “It might seem like this at all academic medical centers, but it’s not — the opportunities for collaboration make Northwestern a unique place.”

## Small Inventions, Big Impact

Radiology isn’t just diagnostic, either. The translational pipeline has also produced discoveries and actionable clinical improvements in treating liver cancer, for example.

One major issue with traditional chemotherapy is its side effects: In order to kill a tumor growing inside the body of patient, clinicians inevitably end up irradiating non-cancerous tissue. However, Northwestern scientists and clinicians have refined techniques to fight cancer from the inside, according to [Riad Salem, MD](#), vice chair for image guided therapy and chief of Vascular Interventional Radiology.

One innovative technique uses microspheres: microscopic glass beads with a radioactive core. In a technique called radioembolization, millions of microspheres are injected, through a catheter, directly to the liver.

“These are so small and once they become inert, they don’t affect anything — akin to sutures they might use in a surgery,” said Salem, who is also a professor of Medicine in the Division of [Hematology and Oncology](#) and a professor of [Surgery](#) in the Division of [Organ Transplantation](#). “They emit their radiation for about two weeks, and they’re very effective at killing the tumor. Our clinical outcomes are world-class, and our research is redefining standards of care.”

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 of augmenting physicians — rather than an existential threat — to handle the massive amounts of information that newer modalities can generate.

“It’s just not possible for a single human being to comprehend and understand all of that,” Carr said. “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 said. “Because of our clinical volume and our digital infrastructure, we are poised to drive this whole area forward from a research perspective.”

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# Polsky Urologic Cancer Institute Research Award

The Polsky Urologic Cancer Institute of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University at Northwestern Memorial Hospital is committed to driving transformative new insights and successes in urologic cancer research, education and discovery. To achieve this mission, the Institute offers awards to support clinical, laboratory or translational projects with promising potential to advance knowledge and foster new, innovative research in the field of urologic oncology.

**About the Funding Opportunity:** The objective of the Polsky Urologic Cancer Institute Research Award is to increase understanding of urologic cancers and enable novel approaches to the prevention, detection and treatment of these cancers. Research supported through this mechanism should directly address questions in basic, clinical or translational urologic cancer research and result in meaningful data that could lead to subsequent extramural funding.

**Eligibility Criteria:** Awards are open to scientists (PhD) and physician-scientists (MD or MD/PhD) with a faculty appointment at an academic institution in the United States. Applicants who do not have a Northwestern University appointment must provide a letter of support from a Northwestern University faculty member, who would serve as a collaborator on the project.

**Terms of Award:** Individual projects are funded for up to \$200,000 annually for an award period of one to three years. The amount awarded will be determined based on the merit and feasibility of the proposed research. Allowable expenses include: lab supplies and equipment; lab personnel; and clinical research coordination, data management and regulatory support.

Progress reports will be required at six-month intervals after funding begins. Awardees will be followed for progress and outcomes, including publications, abstracts, national presentations, later phase studies and peer-reviewed funded research.

Projects that successfully demonstrate feasibility may be selected to apply for additional funding to further develop their concepts and maximize translational impact.

**Selection Criteria:** All proposals will be reviewed by the Polsky Urologic Cancer Institute Scientific Review Committee. The members of this committee are scientists and physician-scientists with demonstrated excellence in urologic cancer research and clinical trials. Proposals will be evaluated for scientific merit, potential impact on the field of urologic oncology, qualifications of the research team, and alignment with the goals and activities of the Polsky Urologic Cancer Institute.

**Proposal Deadline:** June 3, 2019. Notification of selection: July 15, 2019. Funding period: September 1, 2019- August 31, 2020.

## Submission

**A complete application includes:** Project summary/abstract (limit 250 words); research plan (limited to five pages that include: background, specific aims, methods, expected results and significance/innovation of the proposed project); budget justification; and biosketches for PI and key personnel.

Applications should be submitted electronically as a single PDF file to Mary Kate Keeter at [marykate.keeter@nm.org](mailto:marykate.keeter@nm.org). Any questions should be directed here as well.

## News From the Center for Advanced Microscopy

[Constadina Arvanitis, PhD](#), research associate professor of [Cell and Molecular Biology](#), has been named Director of the [Center for Advanced Microscopy and Nikon Imaging Center](#). "It is an honor to be selected," said Arvanitis, who was previously manager of the Nikon Imaging Center. "I have been a part of CAM for years and have seen it grow into a world-class facility. In this next chapter, I am looking forward to expanding our educational mission and microscopy services to meet the cutting-edge needs of our researchers."

Arvanitis received her PhD in chemical and systems biology from Stanford University. Her research focused on mechanisms of tumor regression upon oncogene inactivation. She was a postdoctoral fellow in the laboratory of Leong Chew, PhD, (one of CAM's former directors), where she studied the cytoskeletal rearrangements that occur in endothelial cells when cancer cells breach the endothelium during tumor cell extravasation.





# Using Human-Specific Data to Improve Translation in Kidney Therapeutics

Jennie Lin, MD, MTR, assistant professor of Medicine in the Division of Nephrology and Hypertension



[Jennie Lin, MD, MTR](#), assistant professor of [Medicine](#) in the Division of [Nephrology and Hypertension](#), is a physician-scientist dedicated to investigating the functional significance of human-based genomic and transcriptomic discoveries in cardiometabolic and kidney disease. Lin's laboratory employs an integrative approach, including cellular models derived from human induced pluripotent stem cells with genome-editing technology, animal-based mechanistic studies and transcriptomic and proteomic discovery.

Lin joined Northwestern from the University of Pennsylvania, where she completed a fellowship in renal diseases and earned a master's in translational research.

Follow Lin on Twitter [@jenniejlin](#).

## Q&A

### What are your research interests?

In short, my group is interested in the functional genomics of kidney diseases and their cardiometabolic complications. We perform functional follow-up of discovery results from human-based studies. Because kidney disease and its cardiovascular complications are complex traits not well modeled in mice, we focus on targets that are human-specific. For example, we are interested in elucidating the functions of [long non-coding RNAs](#) that are poorly conserved across species but that may have causal relevance in human disease. We have also been using human stem cell-derived 3D kidney organoids to model the primate-specific APOL1 nephropathy, followed by single-cell RNA-sequencing of these organoids to elucidate novel biology, such as dysregulated ER stress in the presence of risk-variant APOL1.

### What is the ultimate goal of your research?

The mission of my lab is to leverage human discovery-based data to identify novel therapeutic targets to slow and reverse the progression of kidney disease. As a physician-scientist in nephrology, I am inspired to use functional genomics to expand our clinical toolbox for kidney health. Over the past two decades, translation of new therapies for the kidney to the bedside has been slow, but I hope that with increasing availability of genetic and transcriptomic data, development of three-dimensional kidney cell culture models, and accessibility of scalable genome editing, my group will be able to contribute cutting-edge research poised for eventual translation back to clinic.

### What types of collaborations are you engaged in across campus (and beyond)?

Functional genomics, by its nature, requires collaborative efforts. My group currently collaborates with Benjamin Freedman, PhD, at the University of Washington for modeling genetic diseases with kidney organoids, Benjamin Humphreys, MD, PhD, at Washington University in St. Louis for single-cell RNA-sequencing approaches, and Mingyao Li, PhD, at the University of Pennsylvania for statistical methods in analyzing single-cell RNA-sequencing data.

At Northwestern, we also have strong collaborations with [Edward Thorp, PhD](#), associate professor of [Pathology](#), for our functional genomics work in macrophage biology.

### How did you become interested in this area of research?

As a physician-scientist, I am inspired to take a deep dive into science for my patients. I've always been bothered by the differences between human and mouse that drive the gap in clinical translation for kidney disease. To circumvent these differences, my group focuses not on what is conserved, but rather what is different across species.

### How is your research funded?

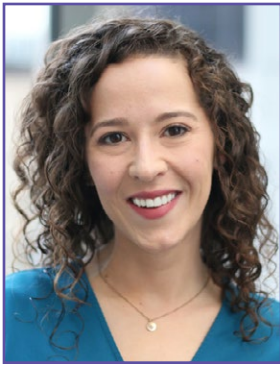
As an early career investigator, I am currently an NIH-KO8 awardee, soon to be embarking on the K to R transition.

### Who inspires you?

I am inspired by Jennifer Doudna, PhD, of the University of California, Berkeley, who was one of the scientists integral to the repurposing of CRISPR for genome editing. In one of her recent talks, she explained that she still wants to figure out how molecules work and still holds a genuine passion for science that has not been diluted by her scientific fame and success.

# Minimizing Disparities in Women's Health

Elizabeth Waldron, Clinical Psychology PhD Program



Elizabeth Waldron, a third-year student in the [Clinical Psychology PhD Program](#), examines the efficacy of mindfulness-based interventions in treating depressive and post-traumatic stress symptoms among vulnerable women with chronic health conditions in the laboratory of [Inger Burnett-Zeigler, PhD](#), assistant professor of [Psychiatry and Behavioral Sciences](#).

## Q&A

### Where is your hometown?

I was born and raised in Trenton, New Jersey, but I spent my later adolescence in Philadelphia, so I claim both places as my hometown.

### What are your research interests?

I am pursuing a dual emphasis in behavioral medicine and adult psychopathology and treatment. The foundation of my research interests is studying how to minimize disparities in women's health, particularly mental health, throughout the lifetime. One avenue through which I explore this is studying the intersection of physical and psychological sequelae following potentially traumatic events. My current work examines the efficacy of mindfulness-based interventions in treating depressive and post-traumatic stress symptoms among vulnerable women with chronic health conditions.

### Can you share more about your mindfulness studies?

I'm currently involved in two. The first is conducting focus groups with pregnant and parenting women living with HIV about the stress they experience, how they cope with that stress, and if they would be interested in using mindfulness skills or a mindfulness group to help them. I am working with the study's principal investigators to synthesize the data from these groups to be used in designing and implementing a mindfulness-based intervention tailored to the specific needs of this population.

The second is testing whether a group mindfulness-based intervention leads to reductions in post-traumatic stress symptoms among trauma-exposed women on the South Side of Chicago. The data from this project comes from part of Dr. Burnett-Zeigler's research study, M-Body. M-Body is a mindfulness-based stress reduction program adapted for a Federally Qualified Health Center patient population and healthcare service delivery setting. Like mindfulness-based stress reduction, M-Body is an eight-week group intervention that uses informal and formal mindfulness practices, such as meditation, gentle yoga, didactic and inquiry.

### What attracted you to the PhD program?

I applied to the clinical psychology doctoral program at Northwestern for two reasons. The first was the program's combined focus on research and clinical work. I was looking for a program where I would receive exceptional training to become both an insightful clinician and a researcher who could make meaningful contributions. The second was the opportunity to work with Dr. Burnett-Zeigler, who investigates how to improve access and engagement with mental health treatment for traditionally underserved populations. My work prior to graduate school, first as a Peace Corps volunteer in Paraguay and then as a behavioral medicine research assistant at Temple University, instilled in me a passion for improving the health of those who too often lack access to quality care. I felt that working in Dr. Burnett-Zeigler's lab at Feinberg was the ideal place to prepare myself to do this through clinical psychology.

### What has been your best experience at Feinberg?

The best part so far has been working with my incredible colleagues. In class, lab and clinical rotations, my fellow students and research-mates challenge me to think more critically and to broaden my perspective. I feel fortunate in how we are able to support each other through graduate school.

### How would you describe the faculty at Feinberg?

The faculty in the clinical psychology doctoral program teach from real-world experience and that enriches the content of their classes. Their insight into different aspects of psychology and clinical work is so valuable as we, the students, develop as clinicians and researchers.

### What do you do in your free time?

I really enjoy running outside whenever the weather permits. I completed my first marathon this October and it gave me an incredible sense of accomplishment. I would like to travel to new cities for distance races in the future (or just for vacations!). I also appreciate getting to spend quality time with family, friends, my boyfriend and our dog.

### What are your plans for after graduation?

Beyond graduate school, I hope to attain a faculty position at an academic medical center where I will contribute to improving the understanding of and treatments for mental health and trauma through translational research, clinical work and teaching.

Connect with Liz on [LinkedIn](#).

# Enhancing Clinical Research Through Innovative and Supportive Training Programs

Emily Traw, Assistant Director, Center for Education and Career Development, Northwestern University Clinical and Translational Institute (NUCATS)



## Q&A

### Where are you originally from?

I grew up in Northeast Iowa and have lived in Chicago since 2008.

### What is your educational background?

I have a bachelor's degree in American studies from the University of Iowa, and a Master of Science in Human Resources

and Organizational Development from Loyola University Chicago. I'm currently taking advantage of Northwestern's generous tuition benefits to pursue a doctorate in education with a focus on equity and diversity at the University of Illinois at Urbana-Champaign.

### Please tell us about your professional background.

I've been working at [Northwestern University Clinical and Translational Institute \(NUCATS\)](#) for two and a half years and previously worked at the University of Chicago for eight years. I started at the University of Chicago as an administrative coordinator in the department of microbiology. I moved into a role in that department where I managed faculty affairs, human resources and graduate student affairs. Following this, I moved again into a position overseeing five PhD programs in the biomedical sciences. I was always a bookworm and history buff and never envisioned myself working in the field of science, but I have really enjoyed the environment, the people and the work.

### Why do you enjoy working at Northwestern?

I really appreciate the collaborative and supportive environment here. I love being surrounded by curious people who are committed to solving problems — be those in research, training or administration. My role at NUCATS has allowed me to work in an area that appeals to my belief in education as a powerful source of transformation and empowerment.

### How do you help scientists at the medical school?

The goal of the [Center for Education and Career Development](#) is to enhance clinical research through innovative and supportive training programs. We offer a host of training opportunities for clinical research staff, along with mentored career development programs and workshops for junior investigators. All of this programming is intended to enable research professionals to design and carry out high-impact clinical research that is also safe, efficient and effective.

### What is your favorite part of the job?

I love working with coworkers to solve problems and seeing people who have taken part in our programs go on to make contributions to the world of research.

### What exciting projects are you working on?

We are working with the CTSA Institutes at The University of Chicago and the University of Illinois at Chicago to better understand gaps in training and professional development among research staff, as well as thinking more about career pathways for clinical research professionals.

We have recently expanded our [Science Immersion Program](#) so that we are working with students at Northeastern Illinois University in addition to Chicago State University. This program runs over the summer each year and brings master's students from the two universities to complete lab experiences with Northwestern scientists. We've gotten incredible feedback from past participants about the impact of this program, and seeing it expand regionally has been really rewarding.

### What do you like to do in your spare time?

I love traveling to new places, trying new foods and biking around the city once the weather is a little warmer. I'm also a member of a master's swim team called the Chicago Smelts, and try to get in a few practices each week just to maintain my sanity. Next spring, I'm combining my love of swimming and traveling by going on a swim vacation with fellow teammates in Crete!

Connect with Emily on [LinkedIn](#).

# Research in the News

## ***U.S. News & World Report, March 27***

[Only Spoken Words Processed in Newly Discovered Brain Region](#)

Sandra Weintraub, PhD, was quoted.

► This research was also featured in *HealthDay*.

## ***CNN, April 1***

[An hour of activity may keep disability away, new research shows](#)

Dorothy Dunlop, PhD, was quoted.

► This research was also featured in *U.S. News & World Report*, *HealthDay*, *WebMD* and *USA Today*.

## ***Chicago Tribune, April 11***

[Poverty plays role in DNA structure changes, study involving Northwestern professor finds](#)

Thomas McDade, PhD, was quoted.

► This research was also featured in *U.S. News & World Report* and *HealthDay*.

## ***Crain's Chicago Business, April 17***

[Electromagnetic Pulses Make Memories Stick](#)

Joel Voss, PhD, was quoted.

► This research was also featured in *U.S. News & World Report* and *HealthDay*.

## ***U.S. News & World Report, April 18***

[Whether to Preserve Fertility Is Tough Decision for Transgender Youth](#)

Diana Chen, PhD, was quoted.

► This research was also featured in *HealthDay*.

## ***HealthDay, April 19***

[Almost Half of Young Asthma Patients Misuse Inhalers](#)

Waheeda Samady, MD, was quoted.

► This research was also featured in *U.S. News & World Report*.

## ***The New York Times, April 22***

[Should You Be Eating Eggs?](#)

Victor Zhong, PhD, was quoted.

[More media coverage available online.](#)

## **Latest Podcast Episodes**

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Eyes May Reveal Risk of Alzheimer's Disease with Amani Fawzi, MD.

Listen [here](#).



Improving Memory Loss in Older Adults with Joel Voss, PhD.

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Northwestern University  
**NUCATS**  
Clinical and Translational Sciences Institute

## NUCATS Corner

### NUCATS Accelerates Your Clinical and Translational Discoveries

NUCATS provides investigators, study team members, participants and stakeholders across the research continuum with an array of resources, consultative services and expertise to support clinical and translational research. It is our goal to increase the quality, safety, efficiency, speed and impact of innovative research.

Clinical and translational research exists on a continuum from early discovery to human trials to population health. These phases inform and influence one another, and each phase poses unique challenges and requirements. NUCATS resources and experts are available to support all of our partners across the continuum. We do this through:

**Education:** We offer educational training programs that help [investigators](#) and [research staff](#) gain the skills they need to conduct sound clinical and translational research.

**Funding:** We connect investigators to a wide variety of funding opportunities and provide rapid, targeted funding through our [Voucher & Pilot Programs](#) to meet critical needs at each stage of research.

**Connections:** We work with investigators, stakeholders and patients to catalyze and support meaningful [community partnerships](#), and we work with new and seasoned faculty to foster [mentoring](#) opportunities.

**Support:** We offer resources to investigators, trainees, students and partners to address clinical research, informatics, biostatistical and commercialization needs.

Whether you are an investigator, study team member, participant or stakeholder, NUCATS is here to connect you to a continuum of resources to enhance the efficiency and efficacy of your clinical and translational research. We offer sustainable processes that identify, evaluate, facilitate and disseminate scientific breakthroughs.



# Sponsored Research



**PI: Richard Longnecker, PhD, the Dan and Bertha Spear Research Professor**

**Sponsor: National Institute of Neurological Disorders and Stroke**

**Title: Role of Host Cell Factors in Newborn Herpes Simplex Virus (HSV) Encephalitis**

The majority of newborns infected with herpes simplex virus type-1 (HSV-1) will go on to have severe disease, including viral dissemination and encephalitis, whereas infection in the adult population is typically asymptomatic and benign. The significantly different outcomes between adults and newborns following HSV infection suggest an age-dependent difference in susceptibility to central nervous system (CNS) disease based on host factors.

A relative immaturity of the neonatal immune system is commonly implicated in their overall increased susceptibility to HSV and other neurotropic viruses. However, the precise reasons underlying their increased susceptibility to viral encephalitis remain unknown. This incomplete understanding is a critical barrier to improving survival and neurologic outcomes following HSV encephalitis.

Longnecker's team will investigate the innate immune mechanisms in the brain responsible for differences in susceptibility and severity of HSV disease between the newborn and adult. They will build on their previous work to understand the role of the host response in determining viral tropism within the brain, the contribution of glial cells to HSV-1 infection, and modulation of the blood brain barrier (BBB) by type I interferon (IFN) signaling in the newborn during infection.

Investigating how the newborn brain uniquely responds to viral infection will lead to a better understanding of the innate immune response and glial function during infection of the brain in both age groups, and will elucidate potential targets for immunomodulatory therapy to improve outcomes.

[Read more about this project.](#)



**PI: Kristen Knutson, PhD, associate professor of Neurology in the Division of Sleep Medicine, Preventive Medicine**

**Sponsor: National Heart, Lung, and Blood Institute**

**Title: Leveraging a Unique Existing Cohort to Elucidate the Link Between Sleep and Cardio-Metabolic Disease**

Cardiovascular and metabolic diseases (CMD) remain highly prevalent and a leading cause of death. Among potential risk factors for CMD, the importance of inadequate sleep is gaining recognition. In this project, Knutson's team will capitalize on a large, ongoing family-based study in Brazil that has recruited and enrolled approximately 2,700 participants. The primary objective is to examine detailed measures of sleep and their associations with biomarkers of CMD, to assess sex differences in sleep and cardiometabolic disease, and to identify transcriptional and metabolic pathways as potential mechanisms to explain the effects of sleep on CMD development.

Accumulating data suggest that specific EEG-based characteristics of sleep, such as slow-wave sleep (SWS) or slow-wave activity (SWA; EEG spectral power in the 0.5-4 Hz range), are highly heritable traits that may be drivers of subclinical cardiac and metabolic disease acting through the pleiotropic modulation of several risk factors. Current research has not fully explored the relationship between SWS/SWA and CMD, nor does it address the unknown underlying mechanisms.

The current proposal aims to fill this gap in knowledge by leveraging an existing cohort and adding sleep PSG/EEG, repeated CMD biomarkers and (in a subset) metabolomics and RNA sequencing to improve our understanding of the CMD implications of specific sleep EEG traits.

[Read more about this project.](#)



## Welcome New Faculty

[Alan Nugent, MBBS](#), FRACP, joins as professor of [Pediatric Cardiology](#) and as Section Head of Cardiac Catheterization at Ann & Robert H. Lurie Children's Hospital of Chicago. His research work focuses on expandable conduits and biodegradable stents for structural heart disease. Nugent earned his medical degree from the University of Melbourne, Australia, and completed an internship and fellowship at Royal Children's Hospital in Melbourne. His prior faculty interventional positions have been at Boston Children's Hospital and UT Southwestern Medical Center in Dallas. He has published more than 50 peer-reviewed papers and has been principal investigator on numerous studies, including investigations sponsored by the NIH.



## Call for Principal Investigators

CAPriCORN, a Chicago-wide electronic health data research network, regularly receives requests from academic researchers and industry partners for collaboration on grant proposals or funded studies. If you're interested in serving as a site PI in your area of expertise, please let us know by [visiting this link](#) or by phone at 312-503-8019, and we will contact you when we receive a request that is relevant to your work.

[CAPriCORN](#) includes data on more than 9.5 million residents within the Chicago metropolitan area, including populations that experience significant health disparities and are underrepresented in medical research. It is one of 13 clinical data research networks that constitute [PCORnet](#), a highly representative "network of networks" that collects electronic health data on more than 100 million individuals nationwide.

## Lakeside Discovery Supports Two Labs

[Lakeside Discovery, LLC](#), the collaboration between Northwestern University and Deerfield Management, will support two Northwestern labs to advance their drug-discovery projects.

[Elizabeth McNally, MD, PhD](#), director of the [Center for Genetic Medicine](#), and [Alexis Demonbreun, PhD](#), research assistant professor of [Pharmacology](#), will co-lead a multi-year project to advance pharmaceuticals for the treatment of muscular dystrophies.

[Ali Shilatifard](#), chair of [Biochemistry and Molecular Genetics](#), will lead a multi-year project to advance pharmaceuticals for the treatment of cancers.

"We are excited that the two foundational projects for Lakeside Discovery reflect our commitment to advance Northwestern's transformational innovations to the patient," said [Alicia Löffler, PhD](#), executive director of Northwestern's Innovation and New Ventures Office (INVO) and member of the joint steering committee.

## Funding

### Polsky Urologic Cancer Institute Research Award

See more details on page 3 of this newsletter

[More information](#)

**Sponsor:** Polsky Urologic Cancer Institute of the Robert H. Lurie Comprehensive Cancer Center of Northwestern University

**Submission Deadline:** June 3

**Amount:** \$200,000 annually for one to three years

**Synopsis:** The objective of the Polsky Urologic Cancer Institute Research Award is to increase understanding of urologic cancers and enable novel approaches to the prevention, detection and treatment of these cancers. Research supported through this mechanism should directly address questions in basic, clinical or translational urologic cancer research and result in meaningful data that could lead to subsequent extramural funding.

### Limited Competition Cohort Studies of HIV/AIDS and Substance Abuse (U01 Clinical Trial Not Allowed)

[More information](#)

**Sponsor:** National Institute on Drug Abuse (NIDA)

**Letter of Intent Due:** July 15

**Submission Deadline:** August 15

**Upper Amount:** \$7.5M to fund up to five awards for fiscal year 2020

**Synopsis:** The purpose of this limited competition funding opportunity is to support the maintenance and expansion of existing NIDA-funded cohorts to continue addressing new emerging and/or high priority research on multidisciplinary aspects of HIV/AIDS and substance abuse in alignment with NIH-HIV research priorities. Only applications from grantees previously funded under NIDA funding opportunity announcement, PAR-12-222 are allowed.

### Limited Submission Hartwell Foundation Individual Biomedical Research Award

[More information](#)

**Sponsor:** [The Hartwell Foundation](#)

**Letter of Intent Due:** June 13

**Internal Proposal Due:** July 11

**Amount:** \$100,000 in direct costs per year for three years

**Synopsis:** The Hartwell Foundation provides financial support to stimulate discovery in early-stage, transformative biomedical research with the potential to benefit children of the United States. New applications of existing technology, new technologic approaches to existing problems and where deficient, technology development are sought. In all cases, the foundation seeks risk-taking innovation that addresses an unmet need and has the potential for clinical translation if successful; proposals that accept uncertainty and leverage technology, not studying it. Proposals that already receive or will receive significant extramural funding are ineligible for consideration.

[View more funding opportunities.](#)

# Big Data: Fresh Data for Fresh Approaches



By Sara Gonzalez, Data Librarian

A big data revolution has been taking place in the biomedical field over the past decade. Advances in bioinformatics have allowed ever more sophisticated analyses of large datasets in genomics and the basic sciences, leading to breakthroughs in medical knowledge and diagnostics. Data-driven approaches have also had a transformative effect for clinicians, including those involved in research and patient care. In the Feinberg and Northwestern communities, there are many resources available for big data analyses for clinical studies, some of which we'll cover here.

There are several routes to gathering the data for secondary data analyses, including direct contact with mentors and colleagues, leveraging nationally available datasets such as [NHANES](#), and harvesting datasets from catalogs of research outputs such as [Zenodo](#), Harvard's [Dataverse](#), and Feinberg's institutional repository [DigitalHub](#). Depositing datasets to such catalogs is increasingly required by funders and journals for the purpose of sharing datasets with the wider research community, but how can the community make best use of this deposited data?

Computational analyses of batches of datasets allow patterns to be found and discoveries to be made that may not be possible using smaller datasets. Well-described, quality datasets are vital, as Raghu Chakravarthi, Senior Vice President of Actian, a data management, integration and analytics company says in an [article](#) in the online magazine *AppDeveloper*: "Collecting metadata about data, mining real-time data using anomaly detection techniques for figuring out the outliers, and applying machine learning to cleanse data is the way to improve data quality." In

addition, fresh, up-to-date data can be vital for clinical studies. At Northwestern, a prime source for recent clinical data is the [Enterprise Data Warehouse \(EDW\)](#).

Each day, Northwestern's EDW "loads 2.8 billion new data elements from 142 separate sources, including electronic health records, pathology data from the hospital and research laboratories, biomarker data from research databases and research transactional data from our eIRB and other institutional systems," according to the [EDW web page](#). Bioinformatics and data science professionals can be consulted through the university to perform analyses on data gathered from the EDW, as well as to support [informatics groups and research projects](#). [NUI Research Computing](#) can offer assistance with everything from high-performance computational analyses to secure data storage. Most recently, Galter Health Sciences Library & Learning Center launched the [DataLab](#), a one-stop resource where researchers collecting, storing and analyzing data can schedule consultations, learn about data wrangling classes and clinical research support, and find out more about innovations in data storage and management currently being implemented through Galter's involvement in the [National Center for Data to Health](#) grant (Grant Number U24TR002306), sponsored by the National Center for Advancing Translational Sciences ([NCATS](#)).

As data continues to be produced exponentially in all fields, the same will hold true for healthcare and biomedical data. By keeping attuned to the data resources available through Feinberg and Northwestern, researchers can be ready to apply the latest analytical techniques to the freshest data and make discoveries that will fuel both improved patient care and the research of the future.

# High-Impact Factor Research

Banerjee S, **Gusho E**, Gaughan C, Dong BH, Gu XR, Holvey-Bates E, Talukdar M, Li YZ, Weiss SR, Sicheri F, Sauntharajah Y, Stark GR, Silverman RH. [OAS-RNase L innate immune pathway mediates the cytotoxicity of a DNA-demethylating drug](#). *Proceedings of the National Academy of Sciences of the United States of America*. 2019 Mar;116(11):5071-5076.

Chang BJ, **Kittisopikul M**, Dean KM, Roudot P, Welf ES, Fiolka R. [Universal light-sheet generation with field synthesis](#). *Nature Methods*. 2019 Mar;16(3):235-238.

Chen PC, Liu MH, Du JSS, Meckes B, Wang SZ, Lin HX, Dravid VP, Wolverton C, **Mirkin CA**. [Interface and heterostructure design in polyelemental nanoparticles](#). *Science*. 2019 Mar;363(6430):959.

Chung HU, Kim BH, Lee JY, Lee J, Xie ZQ, **Ibler EM**, Lee K, Banks A, Jeong JY, Kim J, Ogle C, Grande D, Yu Y, Jang H, Assem P, Ryu D, Kwak JW, Namkoong M, Park JB, Lee Y, Kim DH, Ryu A, Jeong J, You K, Ji BW, Liu ZJ, Huo QZ, Feng X, Deng YJ, Xu YS, Jang KI, Kim J, Zhang YH, Ghaffari R, Rand CM, Schau M, Hamvas A, Weese-Mayer DE, Huang YG, Lee SM, Lee CH, Shanbhag NR, **Paller AS**, **Xu S**, **Rogers JA**. [Binodal, wireless epidermal electronic systems with in-sensor analytics for neonatal intensive care](#). *Science*. 2019 Mar;363(6430):947.

Crowley JJ, Szatkiewicz J, Kahler AK, Giusti-Rodriguez P, Ancalade N, Booker JK, Carr JL, Crawford GE, **Losh M**, Stockmeier CA, Taylor AK, Piven J, Sullivan PF. [Common-variant associations with fragile X syndrome](#). *Molecular Psychiatry*. 2019 Mar;24(3):338-344.

**Hoeman CM**, Cordero FJ, Hu G, Misuraca K, Romero MM, Cardona HJ, Nazarian J, **Hashizume R**, McLendon R, Yu P, **Procissi D**, **Gadd S**, **Becher OJ**. [ACVR1 R206H cooperates with H3.1K27M in promoting diffuse intrinsic pontine glioma pathogenesis](#). *Nature Communications*. 2019 Mar;10:15.

Hoxhaj G, **Ben-Sahra I**, Lockwood SE, Timson RC, Byles V, Henning GT, **Gao P**, Selfors LM, Asara JM, Manning BD. [Direct stimulation of NADP\(+\) synthesis through Akt-mediated phosphorylation of NAD kinase](#). *Science*. 2019 Mar;363(6431):1088.

Hu YM, Li M, Lu QS, et.al. (including **Weintraub S**). [A statistical framework for cross-tissue transcriptome-wide association analysis](#). *Nature Genetics*. 2019 Mar;51(3):568.

Krenzlin H, Behera P, Lorenz V, Passaro C, Zdioruk M, Nowicki MO, Grauwet K, Zhang H, Skubal M, Ito H, Zane R, Gutknecht M, Griessl MB, Ricklefs F, Ding L, Peled S, Rooj A, **James CD**, Cobbs CS, Cook CH, Chiocca EA, Lawler SE. [Cytomegalovirus promotes murine glioblastoma growth via pericyte recruitment and angiogenesis](#). *Journal of Clinical Investigation*. 2019 Mar 11;130:1671-1683.

Kunkle BW, Grenier-Boley B, Sims R, et al. (including **Bigio EH**, **Mesulam M**, **Weintraub S**). [Genetic meta-analysis of diagnosed Alzheimer's disease identifies new risk loci and implicates Abeta, tau, immunity and lipid processing](#). *Nature Genetics*. 2019 Mar;51(3):414-430.

**LeBleu VS**, Kalluri R. [Exosomes Exercise Inhibition of Anti-Tumor Immunity during Chemotherapy](#). *Immunity*. 2019 Mar;50(3):547-549.

Levine CS, Markus HR, Austin MK, **Chen E**, **Miller GE**. [Students of color show health advantages when they attend schools that emphasize the value of diversity](#). *Proceedings of the National Academy of Sciences of the United States of America*. 2019 Mar;116(13):6013-6018.

Levine DM, Landon BE, **Linder JA**. [Quality and Experience of Outpatient Care in the United States for Adults With or Without Primary Care](#). *JAMA Internal Medicine*. 2019 Mar;179(3):363-372.

McSharry SS, **Beitel GJ**. [The Caspase-3 homolog DrICE regulates endocytic trafficking during Drosophila tracheal morphogenesis](#). *Nature Communications*. 2019 Mar;10:10.

O'Donnell M, Mente A, Rangarajan S, McQueen MJ, O'Leary N, Yin L, Liu XY, Swaminathan S, **Khatib R**, Rosengren A, Ferguson J, Smyth A, Lopez-Jaramillo P, Diaz R, Avezum A, Lanas F, Ismail N, Yusuf K, Dans A, Iqbal R, Szuba A, Mohammadifard N, Oguz A, Yusufali AH, Alhabib KF, Kruger IM, Yusuf R, Chifamba J, Yeates K, Dagenais G, Wielgosz A, Lear SA, Teo K, Yusuf S, Investigators P. [Joint association of urinary sodium and potassium excretion with cardiovascular events and mortality: prospective cohort study](#). *BMJ-British Medical Journal*. 2019 Mar;364:14.

Piccini JP, Xu H, Cox M, Matsouaka RA, Fonarow GC, Butler J, Curtis AB, Desai N, Fang M, McCabe PJ, Page II RL, Turakhia M, Russo AM, **Knight BP**, Sidhu M, Hurwitz JL, Ellenbogen KA, Lewis WR. [Adherence to Guideline-Directed Stroke Prevention Therapy for Atrial Fibrillation Is Achievable](#). *Circulation*. 2019 Mar 19;139(12):1497-1506.

Zhao J, Chen AX, Gartrell RD, Silverman AM, Aparicio L, Chu T, Bordbar D, Shan D, Samanamud J, Mahajan A, Filip I, Orenbuch R, Goetz M, **Yamaguchi JT**, Cloney M, **Horbinski C**, Lukas RV, Raizer J, Rae AI, Yuan JZ, Canoll P, Bruce JN, Saenger YM, Sims P, Iwamoto FM, **Sonabend AM**, Rabadan R. [Immune and genomic correlates of response to anti-PD-1 immunotherapy in glioblastoma](#). *Nature Medicine*. 2019 Mar;25(3):462.

**Zhong VW**, **Van Horn L**, **Cornelis MC**, **Wilkins JT**, **Ning HY**, **Carnethon MR**, **Greenland P**, Mentz RJ, Tucker KL, **Zhao LH**, Norwood AF, **Lloyd-Jones DM**, **Allen NB**. [Associations of Dietary Cholesterol or Egg Consumption With Incident Cardiovascular Disease and Mortality](#). *JAMA-Journal of the American Medical Association*. 2019 Mar;321(11):1081-1095.

**Zhou GY**, **Lane G**, **Notoe T**, **Arabkheradmand G**, Gottfried JA, **Schuele SU**, **Rosenow JM**, Olofsson JK, Wilson DA, **Zelano C**. [Human olfactory-auditory integration requires phase synchrony between sensory cortices](#). *Nature Communications*. 2019 Mar;10:12.

The Feinberg Research Office regularly tracks research published by Feinberg investigators. The citations are used on web pages, in newsletters and social media, for internal reporting and more. To more accurately track these journals, the Research Office asks that Feinberg investigators use the following institution name in the address field when publishing in peer-reviewed journals: "Northwestern University Feinberg School of Medicine."



# Featured Core

## The Neurodevelopmental Core

[The Neurodevelopmental Core](#) enables the integration of state of the art developmentally sensitive neuroimaging, physiologic and performance-based developmental assessment methods into diverse research programs. Its mission is to make neurodevelopmental methods accessible to faculty and students, as well as to make state-of-the-art neuroimaging and developmental assessment methods accessible for novel investigations and collaborations. It is designed for trainees and junior investigators seeking to launch a developmental program of research and for investigators seeking to incorporate cutting-edge neurodevelopmental methodologies.

The ND Core utilizes four primary pillars of service, including consultation, data collection, data analysis and training. The ND Core offers data collection in a spectrum of domains, including behavioral measures, such as behavioral questionnaires, neuropsychological and neurodevelopmental standardized assessments, and neuroscientific and physiological measures, such as EEG, MRI, eye-tracking and heart rate variability. With a recharge model, it can provide support to investigators at all levels who are seeking to pursue neurodevelopmental methods in their research, and bring together the skillset and resources needed for groundbreaking science.

In order to further its interdisciplinary emphasis, the ND Core has established space on both Chicago and Evanston campuses, which provides connectivity to Lurie Children's, Northwestern Memorial, Shirley Ryan AbilityLab, and graduate students stationed mainly at the Evanston campus.

**Co-Directors:** [Bradley S. Marino, MD, MPP, MSCE](#), professor of [Pediatrics](#) in the Division of [Cardiology](#) and of [Medical Social Sciences](#), and [Elizabeth Norton, PhD](#), assistant professor of [Communication Sciences and Disorders](#) in the [School of Communication](#)

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We were happy to get a mention on Twitter from NIH Director Francis S. Collins. →



## NIH News

### All of Us Research Program Celebrates One Year

In 2016, the National Institutes of Health awarded Northwestern University — along with four other regional institutions making up the Illinois Precision Medicine Consortium — a five-year, \$51 million grant to help launch the longitudinal research initiative on precision medicine. The goal: to gather the data and samples of one million volunteers to create a resource bank for researchers to better understand health and treat disease.

After the nationwide launch of the *All of Us* Research Program, a [symposium](#) was held commemorating the occasion, allowing time for a retrospective discussion on the dataset's potential for scientific impact. The beta release of the [Data Browser](#), an interactive tool giving the public a first look at participant data, was also announced at the event.

Over the last year, Northwestern has served as lead member of the Illinois Precision Medicine Consortium, spearheading study design efforts, supporting the secure storage and organization of national datasets, and participating in the program's ambitious recruiting efforts. [Joyce Ho, PhD](#), research assistant professor of [Preventive Medicine](#) and lead investigator on the project, reports that the program has recruited 140,000 participants nationally. Of those recruited, 14,000 are Illinois participants, 88 percent of whom have backgrounds previously underrepresented in biomedical research — the highest percentage compared to enrollment sites across the country. For a closer look at the data, visit the *All of Us* [Research Hub](#).

### Notice of Upcoming Change in Federal-Wide Unique Entity

The Data Universal Numbering System (also known as DUNS) will be replaced by a new government-owned unique entity identifier in all systems, including [grants.gov](#) and eRA Commons. Read more about this change, which will take effect December 2020, [here](#).



**Francis S. Collins** @NIHDirector · Apr 18

#Epilepsy often has a genetic basis, and yet too many people lack an explanation for their #seizures. This @NorthwesternU researcher hopes to change that by studying tiny DNA fragments that spill from the brain. Learn more! #NIH

