

# Breakthroughs

Feinberg School of Medicine Research Office

March 2020



## Enhancing Healthcare with AI Technology

By Erin Spain

In today's era of machine learning and artificial intelligence (AI) in medicine, Feinberg has the opportunity to not only create and implement new AI tools that enhance healthcare, but also set ethical standards for how these tools are developed and used in the medical profession.

"We can't afford to 'move fast and break things,' because if we break things, people might die," said [Abel Kho, MD](#). "We have to be very thoughtful, from the bottom data layer all the way up to the application layer, to be sure we are doing everything in an ethical, responsible way."

As the director of Feinberg's new [Institute for Augmented Intelligence in Medicine](#) (I.AIM), Kho has laid out a vision for the Feinberg community to consider when approaching AI projects. Kho said the institution's name, which uses the word "augmented" instead of "artificial," is deliberate.

"This technology is a tool, like a stethoscope or scalpel. And it's not the only way you deliver care," said Kho, also an associate professor of [Medicine](#) in the Division of [General Internal Medicine and Geriatrics](#). "We want to emphasize the human touch in medicine and how it can be enhanced or augmented with technology, not replaced."

This institute will explore the application of computational methods — such as machine learning, artificial intelligence,

pattern recognition, genetic analysis and deep phenotyping of health data — to build useful, responsible tools that put people first, Kho said.

### Seven Guiding Principles

Kho has created guiding principles for the institute modeled off the Hippocratic oath, which all new physicians take in the form of the modern Declaration of Geneva, swearing to uphold a number of professional ethical standards. They are:

1. Value privacy
2. Act with humility
3. Endeavor ethically
4. Move deliberately, don't break things patients or clinicians depend on
5. Respect patients and clinicians
6. Augment the physician's tools, maintain centrality of people in the practice of medicine
7. Beneficence (do what's right)

### Building the Pipes

Recent Feinberg publications involving AI models and tools have made headlines for improving [breast](#) and [lung cancer](#) detection, analyzing [placental](#) health and enhancing the standard [stethoscope](#). Such projects are inspiring but will not be the bulk of the I.AIM's early projects, Kho said. First, infrastructure needs

AI (continued from cover page)

to be built to ensure scientists have a pipeline of secure, high-quality data and access to the most advanced analytics tools, computing capacity and administrative infrastructure.

“What we’re seeing in AI healthcare and in research is that it’s been set up in these little bespoke sort of shops. It’s a cottage industry, oftentimes lacking the scalable infrastructure that you would need—data infrastructure and administrative infrastructure—to support a larger volume of data research or research on larger data volumes,” Kho said.

As the “pipe building” takes place, the new institute will bring together research, education and sustainable innovation, offering opportunities for faculty, students and trainees, as well as collaborations with other Northwestern schools including the McCormick School of Engineering, Kellogg School of Management and Pritzker School of Law.

**An Early Interest in Data**

Kho’s path to becoming the director of I.AIM came with some twists and turns. As an undergraduate, he studied theoretical and applied mechanics (now part of mechanical engineering) and then took a job in England as an administrative temp, managing budgets for the London Region of English Heritage. It was there he realized the value of databases and managing data across a population. Soon after, he took a position with a consultancy firm where he worked on a project that organized recipe ingredients in a large database for a major food company, another early lesson in the value of ontologies and databases.

These experiences stuck with him throughout his medical school education, residency and chief residency in Internal Medicine at the University of Wisconsin, Madison. He ultimately decided to complete a National Library of Medicine/National Institutes of Health fellowship in Medical Informatics at the Regenstrief Institute in Indianapolis, Indiana.

“People were quite surprised to hear I was going to do medical informatics in Indianapolis, because I had been on a path to go into pulmonary critical care,” Kho said. “But it was a fortunate pivot and gave me a chance to work with amazing leaders in



informatics, many of whom remain close colleagues and friends.”

He chose to come to Northwestern Medicine after his Regenstrief fellowship because he saw that the healthcare system was embracing electronic medical records and knew there was research potential in this area. Soon he was appointed director of the [Center for Health Information Partnerships](#) in the [Institute for Public Health and Medicine \(IPHAM\)](#) at Feinberg and began managing projects to bring people, communities and data together to drive measurable and sustained improvement in health. He also has an active primary care practice, which helps inform the clinical relevance of his research.

**The I.AIM Team**

Now, in his director role with I.AIM, Kho has assembled a team of Northwestern faculty who also have experience or interest in data science with the mission to bridge computational methods with human expertise to advance medical science and improve human health.

The institute’s central data team will be led by: Chief AI Officer [Yuan Luo, PhD](#), an associate professor of [Preventive Medicine](#) and at the McCormick School of Engineering; Chief Data Engineer [Mozziyar Etemadi, MD, PhD](#), a research assistant professor at the McCormick School of Engineering and of [Anesthesiology](#) at Feinberg; Chief Informatics Officer [Firas Wehbe, MD, PhD](#), Feinberg’s chief research informatics officer and associate professor of Preventive Medicine and of [Pathology](#); and Chief Ethics Officer [Kelly Michelson, MD, MPH](#), director of the IPHAM’s [Center for Bioethics and Medical Humanities](#) and the Julia and David Uihlein Professor of Bioethics and Medical Humanities.

The Institute for Augmented Intelligence in Medicine will initially include the following centers:

- Center for [Computational Imaging and Signal Analytics in Medicine](#)
- Center for [Deep Phenotyping and Precision Therapeutics](#)
- Center for [Advanced Molecular Analysis](#)
- Center for [Biomedical Informatics and Data Science](#)
- Center for [Medical Education in Data Science and Digital Health](#)
- Center for [Bioethics and Medical Humanities](#)

Membership in the institute is open to faculty from all Northwestern University schools. Those interested can visit the institute website and fill out a request for more information.

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# Drugs previously in development for SARS could be effective for COVID-19

[Karla Satchell, PhD](#), principal investigator for the [Center for Structural Genomics of Infectious Diseases](#) and professor of [Microbiology-Immunology](#), is leading an international team of scientists investigating the structure of the SARS CoV-2 virus to understand how to stop it from replicating, and a potential drug target has been identified in a newly mapped protein of SARS-CoV-2, the virus that causes coronavirus disease 2019 (COVID-19).

SARS-CoV-2 is responsible for the current outbreak of COVID-19. At publication time, the pathogen had infected more than 454,000 people globally and caused at least 20,000 deaths. Millions of people are being quarantined, and the epidemic has impacted the world economy. There is no existing drug for this disease, but the scientists said their findings suggest drugs that had previously been in development to treat the earlier SARS outbreak could now be developed as effective drugs against COVID-19.

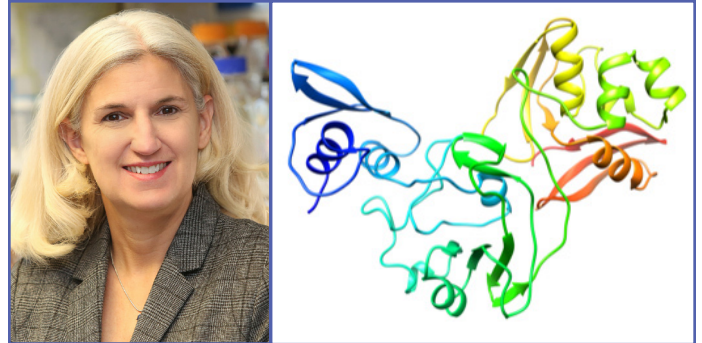
The protein Nsp15 from Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is 89 percent identical to the protein from the earlier outbreak of SARS-CoV. Studies published in 2010 on SARS-CoV revealed that inhibition of Nsp15 can slow viral replication. This suggests drugs designed to target Nsp15 could be developed as effective drugs against COVID-19.

Mapping a 3D protein structure of the virus, also called solving the structure, allows scientists to figure out how to interfere in the pathogen's replication in human cells.

Satchell said, "The NSP15 protein has been investigated in SARS as a novel target for new drug development, but that never went very far because the SARS epidemic went away, and all new drug development ended. Some inhibitors were identified but never developed into drugs. The inhibitors that were developed for SARS now could be tested against this protein."

Rapid upsurge and proliferation of SARS-CoV-2 raised questions about how this virus could become so much more transmissible as compared to the SARS and MERS coronaviruses. The scientists are mapping the proteins to address this issue.

Northwestern is the lead site for the international center that comprises eight institutions, including the University of Chicago and University of California Riverside School of Medicine. The center has committed resources across all eight sites since the news of the new coronavirus was made public in January. The structure of Nsp15 is the first structure solved by the center.



*Left: Karla Satchell, PhD, professor of Microbiology-Immunology, principal investigator and co-director of the Center for Structural Genomics of Infectious Diseases. Right: This newly mapped coronavirus protein, called Nsp15, helps the virus replicate.*

Satchell, along with the entire center team, will map the structure of some of the 28 proteins in the virus in order to see where drugs can throw a chemical monkey wrench into its machinery. The proteins are folded globular structures with precisely defined function and their "active sites" can be targeted with chemical compounds.

Satchell and her team are well prepared for the challenges that come with developing drugs to fight the virus. The Center for Structural Genomics of Infectious Diseases, established in 2007, is funded as a contract from the National Institute of Allergy and Infectious Diseases, part of the National Institutes of Health (NIH), in part to serve as a response site for structure biology in the event of an unexpected infectious disease outbreak. The center has mapped more than a thousand parts of lethal bacteria and viruses in three dimensions, exposing an intimate chemical portrait of diseases.

Satchell also is a member of the [Robert H. Lurie Comprehensive Cancer Center](#) of Northwestern University.

## Breakthroughs Podcast

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



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# Investigating Molecular Genetics Behind Women's Cancers

Timothy Lane, PhD, Associate Dean for Graduate Studies and Professor of Medical Education and of Biochemistry and Molecular Genetics



[Timothy Lane, PhD](#), is the associate dean for Graduate Studies and a professor of [Medical Education](#) and of [Biochemistry and Molecular Genetics](#). He recently joined Feinberg's faculty in 2019 with his wife, [Luisa Iruela-Arispe, PhD](#), who was appointed chair of the Department of [Cell and Developmental Biology](#). Prior to joining Feinberg, Lane was an associate professor of Obstetrics and Gynecology and of Biological Chemistry at the University of California, Los Angeles. He has published more than 60 peer-reviewed scientific articles exploring women's cancers, specifically exploring how stem cells impact the development and progression of such cancers.

## Q&A

### What are your research interests?

My research interests have focused on women's health with a particular interest in stem cells that impact breast cancer, ovarian cancer and osteoporosis.

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

To understand fundamental biological interactions that regulate the establishment of adult stem cell compartments and their relationship to aging and disease.

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

I have always been interested in the biological circuits that regulate development. When I was a postdoc, I was lucky to discover a signaling protein that impacted adult stem cell compartments in various tissues. I chose to study cancer and osteoporosis as they have a big impact on women in my family and were a perfect fit with my research interests.

### What types of collaborations are you engaged in across campus?

Here at the Feinberg, I am focused on graduate and medical education and am forging new relationships to develop curriculum and research opportunities.

### Where have you recently published papers?

I have been lucky to be published in the *Journal of Cell Biology*, the *Journal of Clinical Investigation*, several journals in the Cell Press consortium, including *Developmental Cell* and *Cell Metabolism*, and in more specialty journals.

### Who are your mentors?

I'm fortunate enough to have been mentored by several great scientists and been exposed to top training environments throughout my career. I was possibly most impacted in my choice of research and clinical interests by the women in my family who were devoted to science and by my post-doctoral mentor Dr. Philip Leder who was an inspiration as both a scientist and a mentor.

## Welcome New Faculty

[Kathrin LaFaver, MD](#), joins as associate professor of [Neurology](#) in the Division of [Movement Disorders](#). Previously, she was an assistant professor of neurology at the University of Louisville. She has completed fellowships in movement disorders at Beth Israel Deaconess Medical Center in Boston and the National Institute of Neurological Disorders and Stroke in Bethesda, Maryland. LaFaver's research is focused on studying the pathophysiology of functional movement disorders (FMD), a common cause of disability with the potential to restore normal neurologic function through motor retraining and psychotherapy. In collaboration with the Shirley Ryan Ability Lab, she has established a multidisciplinary FMD clinic, with the goal of optimizing currently available treatment interventions. LaFaver is chair of the FMD study group of the International Parkinson and Movement Disorder Society and aims to set up a multicenter FMD registry to study the prevalence, risk factors and natural history of this disorder.



# Studying Complex Cellular Signaling Pathways

Caleb Stubbs, fourth-year student in the Driskill Graduate Program in Life Sciences (DGP)



## Q&A

### Where is your hometown?

I was born and raised in Queens, New York. Around the age of 14, I moved with my family to Raleigh, North Carolina.

### What are your research interests?

I've always been interested in studying complex cellular signaling pathways. My undergraduate experience working at Pepperdine

University solidified my fascination with signaling. At Pepperdine, I studied Notch signaling during blood vessel formation in human endothelial cells.

Here at Feinberg, I'm investigating aberrant cancer cell signaling during tumor growth, using a combination of biochemical and structural approaches in the laboratory of [Dr. Karla Satchell](#).

### What exciting projects are you working on?

My work focuses on a protein called Ras that is hyper-activated in 30 percent of human tumors and causes uncontrolled cell growth. Ras has been considered an "undruggable" target: There are zero FDA-approved drugs targeting Ras on the market.

Our lab has identified an enzyme secreted from a bacterium, *Vibrio vulnificus*, that inactivates Ras directly. Currently, I am studying how we can use this enzyme as a therapeutic tool to inhibit tumor cell growth.

### What attracted you to your program?

The major factor was the broad research areas. Shortly after interviewing with the program, there were several labs I could see myself working in. I was comfortable around the faculty and students in the program, which added to my positive impression of Northwestern and the DGP.

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

My best experience has been the people I have met throughout my time here. There is an amicable atmosphere with everyone you meet, which is very encouraging given the highs and lows that come with conducting research.

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

The faculty here are very involved and motivated to train graduate students. They push you to ask critical questions and perform rigorous research that will help you succeed at the next level.

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

In Chicago, I have participated in many activities outside of the laboratory. I've played in pool leagues, run Chicago races and attended many Bulls and Cubs games.

### What are your plans for after graduation?

I plan to stay in the research field and pursue a postdoctoral position at a university or in industry. I'm always interested in learning new information and asking scientific questions!

## Research in the News

### Reuters, February 14

[Why your Valentine might want hot chocolate for that walk on the beach](#)

Mary McDermott, MD, was featured.

### Chicago Tribune, February 18

[Less than 5% of pregnant women have good heart health, according to Northwestern study. Experts say doctors need to do more in response.](#)

Marla Mendelson, MD, and Amanda Marma Perak, MD, MS, were mentioned.

### Reuters, February 26

[Allergists Offer Advice to Parents of Kids With Food Allergies](#)  
Ruchi Gupta, MD, MPH, was mentioned.

### Time, February 27

[How to Manage Your Anxiety About Coronavirus](#)

Catherine Belling, MD, was mentioned.

### USA Today, March 3

[Coronavirus live updates: 9th US. death is confirmed as WHO rejects pandemic](#)

Robert Murphy, MD, was mentioned.

### Chicago Tribune, March 3

[I think I have the coronavirus. What should I do?](#)

Michael Ison, MD, MS, was mentioned.

### New York Times, March 3

[What Pregnant Women Should Know About Coronavirus](#)

Wei Zhang, PhD was featured.

# Creating Elegant Implementation Solutions

Mary Beth Tull, director of Research Oversight and Compliance at the Northwestern University Data Analysis & Coordinating Center (NUDACC).



## Q&A

### Where are you originally from?

I am originally from Waterloo, Iowa. I came to Chicago for undergrad and stayed because I love the city.

### What is your educational background?

I double majored in Psychology and Philosophy for my undergraduate education. I obtained a Master's degree in clinical counseling psychology, thinking I'd become a counselor. I enjoyed my counseling practicum — I went into the homes of people who hoarded and used cognitive-behavioral therapy techniques to help them clean up their living spaces.

But, the practice of counseling just wasn't enough to hold my attention; the philosopher in me was more interested in the underlying justification of those counseling techniques. This interest in efficacy research led me into a career in research operations. I soon realized that the coaching techniques I learned during my training as a counselor were a great asset as a manager.

### Please tell us about your professional background.

My research operations career started at the University of Illinois at Chicago, where I interviewed adolescent girls, their mothers and their romantic partners about their trauma histories and STI-risk behavior.

Then I wanted a new challenge — working on those complex clinical drug trials — so I came to the [Lurie Cancer Center](#) at Northwestern in 2014 as a research project manager. After assisting with the team's 5-year grant renewal, I saw the announcement for NUDACC, and decided to apply for the staff leadership position. I've been with NUDACC for three months now, and I love the work of helping to build a new center.

### Why do you enjoy working at Northwestern?

My work at Northwestern combines my dual passions for practicality and intellectuality. Medical research is grounded by the goal of actually implementing new clinical care practices, but is driven by the innovation and creativity of a lot of smart people. My colleagues' intelligence and drive pushes me to challenge myself every day.

### How do you help scientists and/ or research students at the medical school?

My job is to focus on the research operations, so our scientists can focus on what they do best: the science. If I can help the team's staff members think through and implement an elegant solution to a complex administrative problem, the project's scientific leaders are free to make sure the study's design answers the question they want to ask. Innovative ideas require innovative methods of implementation, so the better I am at my job, the more creative the scientists can be in their research.

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

I love creating an ambitious and supportive environment where the team's staff can develop new skills, knowledge, passions and initiatives in their work. The best part of the job is seeing staff succeed, develop, and then move on to bigger and better projects.

### What exciting projects are you working on?

We just launched the development of a large, multicenter, observational study to learn more about gestational diabetes. More than one thousand women across the country will wear continuous glucose monitors during their pregnancy. At the moment, our team is running four weekly meetings as different groups of scientists discuss and negotiate the study design. We hope to start accrual later this year!

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

During the summer months, you'll find me bicycling the Wisconsin kettles.



## Earn CME credits for Listening to the Breakthroughs Podcast

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)<sup>™</sup>. 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.



# Biomedical Data Science Takes Center Stage at Northwestern



Good decision-making often revolves around available data.

For Stanford University's Nigam Shah, MBBS, PhD, an associate professor of Biomedical Informatics, developing methods to analyze large unstructured datasets holds the potential to change how data-driven medicine is practiced.

"Clinical guidelines don't always suffice, and when they fail, data may have the answer," said Shah, assistant director of Stanford's

Center for Biomedical Informatics Research, during the morning plenary of Biomedical Data Science Day (BDS). "It's an important consideration, because I suspect most of you in this room ultimately want to use data to help patient populations."

Shah's presentation was one of nearly 40 immersive, and often interactive workshops and talks during BDS 2020, held February 4 in Chicago. The event was hosted by the Northwestern University Clinical and Translational Sciences (NUCATS) Institute.

Nearly 300 people attended the sold-out event, taking the opportunity to work hands-on with open-source datasets, enhance their statistical knowledge or learn new tools to navigate the computational biomedical sciences. Event sessions were led by experienced faculty, staff, students and trainees from Northwestern and beyond.

Charlton McIlwain, PhD, professor of Media, Culture, and Communication and vice provost for Faculty Engagement and Development at New York University, closed the event with



an afternoon plenary that explored the question: What would it take to develop data science that is motivated by equity and justice?

"I think it's critical for all of us in the big data/AI/data science community to view our work in a larger context. What we do is important because it has power — the power to help and the power to harm," said [Justin Starren, MD, PhD](#), chief of the Division of [Health and Biomedical Informatics](#) in the Department of [Preventive Medicine](#) and deputy director of NUCATS (shown at left). "The combination of Nigam's and Charlton's talks really captured that range."

Through its [Center for Data Science and Informatics](#), as well as its [Applied Research Informatics Group](#), NUCATS offers a wide range of [resources and services](#), including support for data security and privacy, software tools and development, and access to the ACT Network as well as the Northwestern Medicine Enterprise Data Warehouse.

Among the BDS sessions was one co-led by [Abel Kho, MD](#), associate professor of [Medicine](#) in the Division of [General Internal Medicine and Geriatrics](#), director of the new [Institute for Augmented Intelligence in Medicine](#) and of the [Institute for Public Health and Medicine's Center for Health Information Partnerships](#), and a member of NUCATS, and [Theresa Walunas, PhD](#), assistant professor of Medicine in the Division of General Internal Medicine and Geriatrics.

Their talk, "The Good, the Bad and the Ugly: A Primer on the Wild West of Electronic Health Record Data," encouraged attendees to maintain a healthy skepticism of EHRs while revealing the potential of medical records for clinical and research use when framed in the right context.

"There is so much data coming at us right now: from EHRs and high throughput omics, to data from wearables and many other sources," said Walunas. "The future is dependent on developing people who understand the data and who can form multidisciplinary teams to figure out how to use it effectively for the common good. I think programs like BDS represent ways to get people together, encourage peer-to-peer sharing and foster the interchange of ideas that will set the stage for that future."

# Sponsored Research

**PI: Jeremy Lavine, MD, PhD, assistant professor of Ophthalmology and of Medicine in the Division of Rheumatology**

**Sponsor: National Eye Institute**

**Title: The Role of Beta2-Adrenergic Receptor and Interleukin-6 Signaling in Macrophage-Driven Choroidal Neovascularization**



Neovascular age-related macular degeneration (nAMD) is the leading cause of blindness in the developed world, and is treated solely by inhibiting vascular endothelial growth factor (VEGF). Although highly effective, 15 percent of patients still lose vision despite maximal anti-VEGF therapy. Evidence suggests a role for pro-angiogenic macrophages in nAMD pathogenesis, but currently there are no therapies to specifically target these cells. Interleukin-6 (IL-6), a pro-inflammatory cytokine known to be produced by macrophages, correlates with nAMD activity and is necessary for laser-induced CNV, a mouse model of nAMD.

Our preliminary data demonstrate that beta2-adrenergic receptor (AR) inhibition decreases laser-induced CNV area by reducing IL-6 levels in macrophages. Our central hypothesis is that beta2-AR signaling influences macrophage differentiation, promotes a pro-angiogenic macrophage phenotype, increases IL-6 levels, and activates angiogenesis by activating the IL-6 receptor directly on endothelial cells to increase CNV area.

To test this hypothesis, we formulated the following specific aims: 1) Determine the retinal/choroidal cell type(s) that express interleukin-6 in response to beta2-AR antagonism, 2) Identify the cell type that produces IL-6 and the cell type that responds to IL-6 to increase laser-induced CNV, and 3) Delineate how beta2-AR and IL-6 deficiency regulate the transcriptional profile of macrophages during CNV.

Completion of these aims will determine the cell types that respond to beta2-AR antagonism, produce IL-6, and respond to IL-6 to increase CNV area. These data will set the stage for anti-IL-6 therapy for nAMD. Furthermore, we will delineate how beta2-AR inhibition influences the transcriptomic profile of macrophages in the CNV milieu, which will identify new anti-inflammatory and anti-angiogenic therapeutic targets.

[Read more](#)

**PI: Jin-Shei Lai, PhD, professor of Medical Social Sciences and Pediatrics**

**Sponsor: National Cancer Institute**

**Title: Using Information Technology to Improve Outcomes for Children Living with Cancer**



The Symptom Monitoring & Systematic Assessment and Reporting System in Young Survivors (SyMon-SAYS) program aims to enable timely mitigation and management of unrelieved symptoms for children with cancer. SyMon-SAYS will administer, score, interpret and display the results of symptom assessments in “real-time” between clinic visits in cancer care ambulatory settings, when patients are likely to be more symptomatic. We hypothesize that this system can facilitate prompt identification of problematic symptoms; consequently, with the availability of graphical symptom reports over time, timely providers’ clinical care and an informative symptom management booklet, patients will become informed about their condition and take an active role in treatment, which will further improve self-management skills. Better self-management promotes adherence to treatment plans, builds individual capacity, improves interaction between patients and caregivers, reduces the use of medical specialists and optimizes clinical outcomes across the lifespan throughout the treatment and disease continua.

The proposed waitlist control randomized trial is based on our preliminary study testing the feasibility of the patient-centered SyMon-SAYS in a pediatric oncology clinic. Results showed that the SyMon-SAYS was acceptable to patients/parents and they were willing to use it during their routine clinical care. Clinicians expressed interest in receiving reports yet preferred to review them in the medical record. Based on what we learned from this pilot, we now propose to integrate the SyMon-SAYS system into the electronic health record (EHR), to streamline the alert notification with clinician workflow by using EHR (Epic) messaging, and to include a broader range of symptoms. Patients and parents will complete the weekly symptom assessment and review the symptom report by logging into the Epic MyChart patient portal. Instead of using a standalone SyMon-SAYS app, we will align the SyMon-SAYS program with the Epic EHR.

[Read more](#)



# Funding

## Childhood Asthma in Urban Settings Clinical Research Network – Leadership Center (UM1 Clinical Trial Required)

[More Information](#)

**Sponsor:** National Institutes of Health, National Institute of Allergy and Infectious Diseases (NIAID)

**Submission deadline:** June 19, 2020

**Upper amount:** \$7,000,000

**Synopsis:** The NIAID Childhood Asthma in Urban Settings Clinical Research Network Leadership Center (CAUSE-LC) will provide the overall scientific strategy and organizational structure to the CAUSE Clinical Research Network and will interact closely with the CAUSE Clinical Research Centers (CAUSE-CRCs) to support the conduct of multi-site clinical studies and trials with the ultimate goal of developing effective interventions or asthma prevention approaches applicable to children residing in low-income urban settings.

## Combating Antibiotic-Resistant Bacteria (CARB) Interdisciplinary Research Units (U19 Clinical Trial Not Allowed)

[More information](#)

**Sponsor:** National Institutes of Health, National Institute of Allergy and Infectious Diseases (NIAID)

**Submission deadline:** May 8, 2020

**Upper Amount:** \$10,000,000 to fund 5-6 awards

**Synopsis:** Antibacterial resistance (AR) is a growing global public health threat. In a recent report, the Centers for Disease Control and Prevention estimated that at least 2.8 million people develop an antibiotic-resistant infection and more than 35,000 people die from these infections yearly in the United States. The seriousness of this situation led to national and international efforts to address antibacterial resistance including the United States Government's National Strategy, and [National Action Plan for Combating Antibiotic-Resistant Bacteria \(CARB\)](#) as well as establishment of the [Presidential Advisory Council on CARB](#). This grant seeks to establish Combating Antibiotic-Resistant Bacteria (CARB) Interdisciplinary Research Units (CARBIRUs) focused on improving our understanding of bacterial and host factors important for antibacterial resistance and infection to inform development of new approaches to prevent, diagnose, and treat antibacterial-resistant infections.

## Practice-Based Research for Implementing Scalable Evidence-Based Prevention Interventions in Primary Care Settings (R34 Clinical Trial Required)

[More information](#)

**Sponsor:** National Institutes of Health and National Institute of Mental Health

**Submission deadline:** September 15, 2020

**Upper Amount:** \$450,000 over two years

**Synopsis:** The purpose of this grant is to encourage practice-based research aimed at refining and pilot testing developmentally-focused, theory-based efficacious prevention interventions that may impact mental health outcomes, including suicide behaviors and serious mental illness. The research should test prevention approaches that are both scalable and sustainable for implementation in pediatric-serving primary care settings, with an emphasis on populations experiencing mental health disparities.

## Multidisciplinary Studies to Improve Understanding of Influenza Transmission (U19 Clinical Trial Optional)

[More information](#)

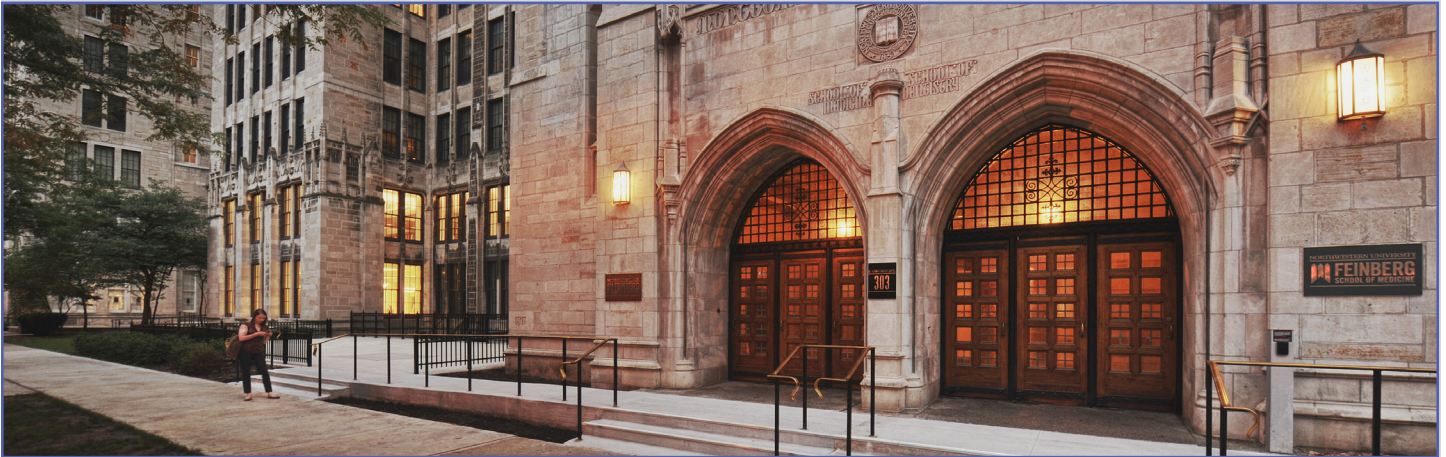
**Sponsor:** National Institutes of Health and National Institute of Allergy and Infectious Diseases

**Submission deadline:**

**Upper Amount:**

**Synopsis:** The purpose of this grant is to solicit applications for collaborative, multidisciplinary research to comprehensively investigate the dynamics and drivers of influenza transmission between humans. This FOA will support research to: (1) improve detection and sampling of influenza viral particles from the air; (2) develop novel assays to assess viability and infectivity of influenza viral particles collected from the air; and (3) comprehensively evaluate the contribution of viral, host, physical, and environmental factors to influenza transmission between humans.

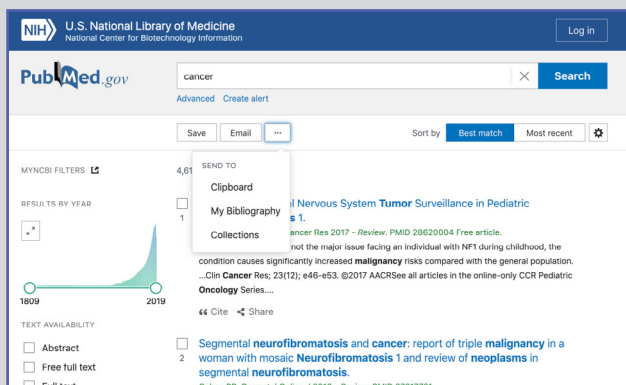
# Get Ready: The New PubMed is Here



The National Library of Medicine has just released [a new version of PubMed](#), accessible from the PubMed homepage. Both versions of PubMed will run side by side for the next few weeks, and you can always try the new interface and return to the old one until the final switch.

Galter Library has created a [new guide](#) and is offering classes covering the new interface. In the meantime, here are a few highlights of how the new PubMed is different from the old, and where you can find the features you already know and love.

- Abstract snippets now show up on the Results page. Preview an article before you click on the title.
- New and improved citing, sharing and page navigation features are available, including pre-formatted citations in AMA, MLA, APA, and NLM formats. You can download .RIS files for EndNote and other reference management platforms.



- At long last, you can now page through your PubMed results from the abstract screen. Hover for details of the previous or next citation.

- Sort by publication date and reverse sort order. Use the Display Options menu (located under the gear button) to change how results are sorted. Sort options include Publication Date in addition to Most Recent and Best Match. When sorting by Publication Date or Most Recent, use the ascending/descending button to show the newest or oldest results first.
- Customize number of items displayed per page. You can also use the Display Options menu to change the number of citations displayed per page.
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# High-Impact Factor Research

Burton A, Obaid SN, Vazquez-Guardado A, Schmit MB, Stuart T, Cai L, Chen ZY, Kandela I, Haney CR, Waters EA, Cai HJ, **Rogers JA**, Lu LY, Gutrup P. Wireless, battery-free subdermally implantable photometry systems for chronic recording of neural dynamics. *Proceedings of the National Academy of Sciences of the United States of America*. 2020;117(6):2835-2845.

Dey N, Kochman ML, **Komanduri S**, Melson JE, Muthusamy VR. Report from the AGA Center for GI Innovation and Technology's Consensus Conference: Envisioning Next-Generation Paradigms in Colorectal Cancer Screening and Surveillance. *Gastroenterology*. 2020;158(3):455-460.

Doebele RC, Drilon A, Paz-Ares L, Siena S, Shaw AT, Farago AF, Blakely CM, Seto T, Cho BC, Tosi D, Besse B, Chawla SP, Bazhenova L, Krauss JC, **Chae YK**, Barve M, Garrido-Laguna I, Liu SV, Conkling P, John T, Fakih M, Sigal D, Loong HH, Buchschacher GL, Garrido P, Nieva J, Steuer C, Overbeck TR, Bowles DW, Fox E, Riehl T, Chow-Maneval E, Simmons B, Cui N, Johnson A, Eng S, Wilson TR, Demetri GD, Trial I. **Entrectinib in patients with advanced or metastatic NTRK fusion-positive solid tumours: integrated analysis of three phase 1-2 trials**. *Lancet Oncology*. 2020;21(2):271-282.

Drilon A, Siena S, Dziadziuszko R, Barlesi F, Krebs MG, Shaw AT, de Braud F, Rolfo C, Ahn MJ, Wolf J, Seto T, Cho BC, Patel MR, Chiu CH, John T, Goto K, Karapetis CS, Arkenau HT, Kim SW, Ohe Y, Li YC, **Chae YK**, Chung CH, Otterson GA, Murakami H, Lin CC, Tan DSW, Prenen H, Riehl T, Chow-Maneval E, Simmons B, Cui N, Johnson A, Eng S, Wilson TR, Doebele RC, Trial I. **Entrectinib in ROS1 fusion-positive non-small-cell lung cancer: integrated analysis of three phase 1-2 trials**. *Lancet Oncology*. 2020;21(2):261-270.

Ferrer JR, Sinegra AJ, Ivancic D, Yeap XY, Qiu L, Wang JJ, Zhang ZJ, Wertheim JA, **Mirkin CA**. Structure-Dependent Biodistribution of Liposomal Spherical Nucleic Acids. *ACS Nano*. 2020;14(2):1682-1693.

Gallego JA, Perich MG, Chowdhury RH, **Solla SA, Miller LE**. Long-term stability of cortical population dynamics underlying consistent behavior. *Nature Neuroscience*. 2020;23(2):260.

Greene DJ, Marek S, Gordon EM, Siegel JS, **Gratton C**, Laumann TO, Gilmore AW, Berg JJ, Nguyen AL, Dierker D, Van AN, Ortega M, Newbold DJ, Hampton JM, Nielsen AN, McDermott KB, Roland JL, Norris SA, Nelson SM, Snyder AZ, Schlaggar BL, Petersen SE, Dosenbach NUF. Integrative and Network-Specific Connectivity of the Basal Ganglia and Thalamus Defined in Individuals. *Neuron*. 2020;105(4):742.

Jin X, Chandramouli C, Allocco B, Gong E, Lam CSP, **Yan LL**. Women's Participation in Cardiovascular Clinical Trials From 2010 to 2017. *Circulation*. 2020;141(7):540-548.

Kosciuk T, Price IR, Zhang X, Zhu C, Johnson KN, Zhang S, Halaby SL, Komaniacki GP, Yang M, **DeHart CJ, Thomas PM, Kelleher NL**, Fromme JC, Lin H. **NMT1 and NMT2 are lysine myristoyltransferases regulating the ARF6 GTPase cycle**. *Nature Communications*. 2020;11(1):1067.

Lioux G, **Liu XL**, Temino S, **Oxendine M**, Ayala E, Ortega S, Kelly RG, **Oliver G**, Torres M. A Second Heart Field-Derived Vasculogenic Niche Contributes to Cardiac Lymphatics. *Developmental Cell*. 2020;52(3):350.

Liu P, Dodson M, **Fang D**, Chapman E, Zhang DD. **NRF2 negatively regulates primary ciliogenesis and hedgehog signaling**. *PLoS Biology*. 2020;18(2):e3000620.

McLean SA, Ressler K, Koenen KC, et al. (including **Elliott JM**). The **AURORA Study: a longitudinal, multimodal library of brain biology and function after traumatic stress exposure**. *Molecular Psychiatry*. 2020;25(2):283-296.

McMurray JJV, Jackson AM, Lam CSP, Redfield MM, Anand IS, Ge J, Lefkowitz MP, Maggioni AP, Martinez F, Packer M, Pfeffer MA, Pieske B, Rizkala AR, Sabarwal SV, Shah AM, **Shah SJ**, Shi VC, van Veldhuisen DJ, Zannad F, Zile MR, Cikes M, Gonçalvesova E, Katova T, Kosztin A, Lelonek M, Sweitzer N, Vardeny O, Claggett B, Jhund PS, Solomon SD. Effects of **Sacubitril-Valsartan Versus Valsartan in Women Compared With Men With Heart Failure and Preserved Ejection Fraction: Insights From PARAGON-HF**. *Circulation*. 2020;141(5):338-351.

Mekhail N, **Levy RM**, Deer TR, Kapural L, Li SA, Amirdeflan K, Hunter CW, Rosen SM, Costandi SJ, Falowski SM, Burgher AH, Pope JE, Gilmore CA, Qureshi FA, Staats PS, Scowcroft J, Carlson J, Kim CK, Yang MI, Stauss T, Poree L, Brounstein D, Gorman R, Gmel GE, Hanson E, Karantonis DM, Khurram A, Kiefer D, Leitner A, Mugan D, Obradovic M, Parker J, Single P, Soliday N, Evoke Study G. **Long-term safety and efficacy of closed-loop spinal cord stimulation to treat chronic back and leg pain (Evoke): a double-blind, randomised, controlled trial**. *Lancet Neurology*. 2020;19(2):123-134.

Moore KM, Nicholas J, Grossman M, et al. (including **Rogalski EJ, Weintraub S, Mesulam MM, Bigio E**). **Age at symptom onset and death and disease duration in genetic frontotemporal dementia: an international retrospective cohort study**. *Lancet Neurology*. 2020;19(2):145-156.

**Moyo MB, Parker JB, Chakravarti D** Altered chromatin landscape and enhancer engagement underlie transcriptional dysregulation in MED12 mutant uterine leiomyomas. *Nature Communications*. 2020;11(1):1019.

Owens DK, Davidson KW, Krist AH, Barry MJ, Cabana M, Caughey AB, Doubeni CA, Epling JW, Jr., Kubik M, Landefeld CS, Mangione CM, Pbert L, Silverstein M, **Simon MA**, Tseng CW, Wong JB. **Screening for Cognitive Impairment in Older Adults: US Preventive Services Task Force Recommendation Statement**. *JAMA*. 2020;323(8):757-763.

Pokatayev V, Yang K, Tu X, Dobbs N, Wu J, **Kalb RG**, Yan N. Homeostatic regulation of STING protein at the resting state by stabilizer TOLLIP. *Nature Immunology*. 2020;21(2):158-167.

Reiman EM, Arboleda-Velasquez JF, Quiroz YT, et al. (including **Mesulam M, Bigio EH**) Exceptionally low likelihood of Alzheimer's dementia in APOE2 homozygotes from a 5,000-person neuropathological study. *Nature Communications*. 2020;11(1):11.

Sheng Y, Yu C, Liu Y, Hu C, Ma R, **Lu X**, Ji P, Chen J, Mizukawa B, Huang Y, Licht JD, Qian Z. **FOXO1 regulates leukemia stem cell quiescence and survival in MLL-rearranged AML**. *Nature Communications*. 2020;11(1):928.

Tarhini AA, Lee SJ, Hodi FS, Rao UNM, Cohen GI, Hamid O, Hutchins LF, **Sosman JA**, Kluger HM, Eroglu Z, Koon HB, Lawrence DP, Kendra KL, Minor DR, Lee CB, Albertini MR, Flaherty LE, Petrella TM, Streicher H, Sondak VK, Kirkwood JM. **Phase III Study of Adjuvant Ipilimumab (3 or 10 mg/kg) Versus High-Dose Interferon Alfa-2b for Resected High-Risk Melanoma: North American Intergroup E1609**. *Journal of Clinical Oncology*. 2020;38(6):567-575.

Wani S, Williams JL, **Komanduri S**, Muthusamy VR, Shaheen NJ. **Time Trends in Adherence to Surveillance Intervals and Biopsy Protocol Among Patients With Barrett's Esophagus**. *Gastroenterology*. 2020;158(3):770-772. e772.

Wilkinson S, Harmon SA, Terrigino NT, Karzai F, Pinto PA, Madan RA, **VanderWeele DJ**, Lake R, Atway R, Bright JR, Carrabba NV, Trostel SY, Lis RT, Chun G, Gulley JL, Merino MJ, Choyke PL, Ye HH, Dahut WL, Turkbey B, Sowalsky AG. A case report of multiple primary prostate tumors with differential drug sensitivity. *Nature Communications*. 2020;11(1):8.

Xia S, Du X, Guo L, Du J, Arnott C, Lam CSP, **Huffman MD**, Arima H, Yuan Y, Zheng Y, Wu S, Guang X, Zhou X, Lin H, Cheng X, Anderson CS, Dong J, Ma C. **Sex Differences in Primary and Secondary Prevention of Cardiovascular Disease in China**. *Circulation*. 2020;141(7):530-539.

Yao MJ, Ventura PB, Jiang Y, Rodriguez FJ, Wang LX, Perry JSA, Yang YB, Wahl K, Crittenden RB, Bennett ML, Qi L, Gong CC, **Li XN**, Barres B, Bender TP, Ravichandran KS, Janes KA, Eberhart CG, Zong H. **Astrocytic trans-Differentiation Completes a Multicellular Paracrine Feedback Loop Required for Medulloblastoma Tumor Growth**. *Cell*. 2020;180(3):502.

**Yoon S, Parnell E, Kasherman M, Forrest MP, Myczek K, Premarathne S, Vega MCS, Piper M, Burne THJ, Jolly LA, Wood SA, Penzes P** Usp9X Controls Ankyrin-Repeat Domain Protein Homeostasis during Dendritic Spine Development. *Neuron*. 2020;105(3):506.

# Featured Core

## The Northwestern University Transgenic and Targeted Mutagenesis Laboratory

The Northwestern University Transgenic and Targeted Mutagenesis Laboratory (TTML) is a shared resource designed to produce genetically engineered mice for Northwestern investigators.

This Core offers Molecular Biology Services, providing full scale mouse modeling. Investigators meet with TTML leaders to discuss the scientific aims of the project, mouse model options, and customized mutagenesis strategy design to best achieve project goals. Technical services provided through this lab encompass guide RNA selection; appropriate repair template design; custom genotyping design; and founder identification and mutation confirmation through PCR and sequencing. Consultation and technical support is provided at multiple points during the project, from project initiation through F1 generation.

Other service provided by this Core include:

### [CRISPR/Cas9 Gene Editing](#)

The Core uses CRISPR/Cas9 to create targeted mutations directly in embryos. Genetic manipulations include knock-out (both large and small deletions), point mutations, small insertional mutations, deletion of cis or trans genetic elements and conditional alleles. Mutations have been made in wild-type embryos, mostly C57BL/6J, as well as mutant embryos supplied by the investigator. Larger more complex mutations, including ROSA26 targeting and targeted conditional knock-ins, are currently generated in ES cells.

### [Transgenics Projects](#)

Transgenic mouse models are generated by the microinjection of purified DNA into the pronucleus of single-cell fertilized mouse zygotes. Microinjected embryos are then surgically transferred into the reproductive tract of a pseudopregnant female who carries the pregnancy to term.

### [Gene Targeting](#)

Traditional gene targeting of B6N- or 129-derived ES cells is available. Electroporated and drug-selected clones are provided to investigators for genotyping or clones can be genotyped by the Core. Potentially targeted clones are expanded for targeting verification and frozen for injection/long-term storage.

### [ES Cell Injection](#)

Targeted ES cell clones generated by the TTML or supplied by the investigator, including frozen clones purchased from international consortiums such as KOMP/IMPC, are injected into blastocyst-stage embryos to generate germline competent chimera.

To learn about more TTML services, including [TTML's process for rederivation](#), [cryopreservation of mouse lines](#), [cryorecovery of mouse lines](#) and more, click [here](#).

# NIH News

## The Role of Music in Healing

The NIH and the John F. Kennedy Center for the Performing Arts are exploring the link between music and health, called the [Sound Health Initiative](#), in partnership with the National Endowment for the Arts. In September the NIH announced a \$20 million investment to fund the initiative's first round of studies.

"You wouldn't, at this point, say music therapy is a well-worked-out science," despite a small body of research showing its effectiveness, NIH director Francis Collins [told AARP](#). But newer technologies and a better understanding of how the brain works are making it easier for scientists to home in on how music affects the brain.

Some of the NIH-funded projects are looking at how music may be able to help improve walking ability in people with Parkinson's disease. Another looks at the potential for music to reduce the likelihood that patients in intensive care will develop delirium — a common complication in hospital care, especially among older adults. There's also a study underway examining music's potential to improve physical and mental health in older adults with cardiovascular disease.

It will be a few years before the results from the Sound Health Initiative research come to light, but once they do, Collins expects that the field of music therapy will "really gather momentum." And with more "solid evidence," Collins is hopeful that music therapy will become a standard treatment for many common health conditions — one that physicians prescribe and third-party payers cover.

## New Certificates of Confidentiality System for Non-NIH Funded Research

Certificates of Confidentiality protect identifiable, sensitive research information from disclosure. While Certificates of Confidentiality are issued automatically for NIH-funded research, non-NIH funded research that collects identifiable, sensitive information can require a certificate.

NIH has updated its Certificate of Confidentiality request process for non-NIH funded research through a new online system. The new system simplifies the request process by using self-certification statements and shortened text fields, rather than attachments. Note that the new Certificates of Confidentiality system requires direct submission by the authorized institutional official, rather than by the investigator or another research team member.

NIH will no longer accept Certificates of Confidentiality requests through the current system as of March 11, 2020. See the [Guide Notice](#) for important details about the transition to the new system.