Breakthroughs

Feinberg School of Medicine Research Office

June 2023

NUSeq Director Xinkun 'Sequen' Wang, PhD, said the facility offers free consultations to investigators and their collaborators.

State-of-the-Art Facilities at the Core of Feinberg Discovery

By Olivia Dimmer

As the field of biomedical research becomes more technology-driven, having access to state-of-the art technology is even more important to accelerate research and discovery.

At Feinberg, the powerful research enterprise is driven by centralized core facilities that offer research services and guidance to investigators whose work requires access to leading-edge technology and who might not otherwise be able to access expensive equipment or have the expertise to use it.

This approach not only saves time and money, but also gives the Feinberg research community the chance to work with subject matter experts and utilize techniques and equipment which are often not available anywhere else.

Enhancing Animal Model Development

In the Transgenic and Targeted Mutagenesis Laboratory (TTML), a recent leadership change has opened new pathways to applying new methods and increasing efficiency, said Styliani (Stella) Markoulaki, PhD, director of the laboratory and research professor in the Department of Cell and Developmental Biology.

As a research-oriented core within the Center for Genetic Medicine, the lab uses cutting-edge genome editing and transgenic technologies to help investigators generate, preserve and recover animal models to further their research. The lab produces genetically engineered mice for all Northwestern University and Chicago Biomedical Consortium investigators.

The TTML also offers project design, reagent development, direct genome engineering in embryos using CRISPR/Cas9 technology, targeting of embryonic stem cells and genotyping services.

Additionally, laboratory staff cryopreserve mouse lines, recover lines from frozen material and help import strains from outside sources.

"We strive to be very productive and efficient so [investigators] can count on us to generate the tools they need to meet their scientific needs and advance their research goals," Markoulaki said.

Staff at the laboratory are highly skilled and have a long history and expertise in transgenic science, targeted genetic manipulation and assisted reproductive technologies, according to Markoulaki.

"We encourage people to reach out and learn more about what we do and what our capabilities are," Markoulaki said. "We are a very collaborative team, always open to discuss new ideas and brainstorm how to tackle the most difficult problems."

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Discovery *(continued from cover page)*

On the Forefront of Genomic Sequencing

Countless research questions center on genetics, and the NUSeq Core facility is the foundation for genomic investigation at Feinberg.

NUSeq provides more than 80 different services, including everything from the sequencing of genomes, exomes and transcriptomes to genotyping and methylation analyses using gene chips.

Additionally, the facility harnesses all the data generated by Feinberg investigators and analyzes it to further our understanding of genomics, said Xinkun 'Sequen' Wang, PhD, director of NUSeq and research associate professor in the Department of Biochemistry and Molecular Genetics.

"Another arm of the facility is dedicated to bioinformatics and data mining," Wang said. "As the facility generates so much data every day and genomics is a big data science, extracting knowledge and insights from the generated data is non-trivial and ever more important."

In addition to standard services, NUSeq offers free consultations to investigators and their collaborators and provides guidance on appropriate technological approaches at the onset of a research project.

Wang said that NUSeq's large user base is a resource in itself, and the facility often helps match investigators to scientists who have undertaken similar research projects or experiments and can offer tips for success.

To keep up with the ever-growing demand for genomic sequencing services, the facility is in the process of adding three new machines to its repertoire this summer, Wang said.

The first, a Complete Genomics DNBSEQ-G400 sequencer, was recently installed and will reduce turnaround time for low- to mid-sample volume projects and provide more options to meet different read length needs.

Coming soon is the Illumina NovaSeq X Plus, which will make whole genome sequencing even more cost effective than it is now and significantly increase NUSeq's sequencing capacity.

Lastly, the facility will add a 10x Xenium In Situ platform to bring state-of-the-art targeted spatial profiling at subcellular resolution, to complement the facility's single cell and spatial discovery workflow.

Even with all the additions, Wang said NUSeq is always looking for ways to offer more technology and resources to Feinberg scientists.

"NUSeq has access to most genomics technology companies and resources in other facilities around the country," Wang said. "If a technology does not seem to exist in NUSeq, I'd encourage users to still reach out to the facility. Most possibly we can find a way to get the work done. The ultimate goal of the facility is to serve all the genomics needs of the Feinberg community and elevate Northwestern genomics research to an even higher level."

Getting the Big (and Small) Picture

Housing the latest state-of-the-art technology from Nikon, Feinberg's Center for Advanced Microscopy and Nikon Imaging Center is one of just ten facilities like it in the world.

The center serves investigators seeking imaging of everything from whole organisms to single molecules, including multiphoton and atomic force microscopy, immunogold staining and bioluminescent and intravital imaging. The center also utilizes Nikon's analysis software, which includes AI image processing.

Constadina Arvanitis, PhD, director of the center and research associate professor of Cell and Developmental Biology, said the center was recently awarded funding from the National Institutes of Health to purchase a Nikon SoRA super resolution spinning disk system, a super resolution microscope.

Additionally, the center welcomed Mariana De Niz, PhD, to the team this spring, who brings with her a wealth of experience in intravital imaging and imaging of parasites.

Any investigator looking for guidance on imaging is welcome to contact the center, Arvanitis said, adding that center staff are passionate about teaching and sharing their expertise.

"We want people to come talk to us as early as possible in their experimental design," Arvanitis said. "We are more than happy to talk to you about your project, even if you aren't planning on using our center. Something as simple as choosing a different fluorophores can impact what types of imaging techniques you'll have access to or how easily you'll be able to analyze your data acquired on your own instrument."

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What Does the New Frontier in Biomedicine Look Like?

By Amanda Morris

Some of Northwestern University's brightest minds in biomedical science converged before a packed auditorium Tuesday, May 30 to discuss the hottest topics in their fields.

Hosted by Provost Kathleen Hagerty, "The New Frontiers of Biomedical Science and Biomedical Engineering" explored wide-ranging matters related to improving the quality of human life, including advances in artificial intelligence (AI), new approaches to treating cancer, the quest for longevity, the potential of regenerative medicine and the promise of bioelectronics.

The event — which took place in Hughes Auditorium — was one of two academic panels organized to discuss contemporary topics of importance of higher education as the University geared up for the inauguration of President Michael H. Schill.

"We've been thinking about this symposium for a while and what constitutes a 'new frontier' in biomedical science or biomedical engineering," said Eric G. Neilson, MD, vice president for medical affairs and Lewis Landsberg Dean, who moderated the event. "We thought the best way to talk about this was to identify scientists from Feinberg, McCormick and Weinberg College to talk about the research areas they have been attracted to and have an informal discussion about hot topics in those areas."

The secrets of aging

To kick off the panel, Dean Neilson asked Douglas Vaughan, MD, about aging and how far investigators can push human life expectancy.

"We're at a unique point of human history where we have a fundamental understanding of the biology of aging as well as an ability to precisely measure biological age," said Vaughan, the Irving S. Cutter Professor and chair of the Department of Medicine, director of the Potocsnak Longevity Institute and physician in chief at Northwestern Memorial Hospital. "Together, those give us an opportunity to potentially unravel this mystery that's intrigued the human species since the beginning of our time on this planet."

Eradicating tumors with blood cells

Shana Kelley, PhD discussed the launch of the Chan Zuckerberg Biohub Chicago as well as her work to use engineering-driven approaches to understand diseases, such as cancer. In recent studies, Kelley and her team pinpointed immune cells in blood that can recognize and destroy cancer cells.

"Our immune cells are constantly surveying the body, trying to figure out if there's a disease or a cell that's turned cancerous," said Kelley, the Neena B. Schwartz Professor of Chemistry and Biomedical Engineering at the Weinberg College of Arts and Sciences and McCormick, professor of Biochemistry and Molecular Genetics, and president of the CZ Biohub Chicago. "We know that immune cells eventually infiltrate into tumors to do hand-to-hand combat in there to get rid of tumor cells. But it had not been discovered previously that you can actually find these cells in the blood."

AI-driven precision medicine

Research generates new data constantly, but are we making the most of it? Abel Kho, MD, and his team combine research data in novel ways and then leverage AI to mine big data to identify new methods for treating diseases, estimate population-level disease burden and perform high-throughput phenotyping.

"If you can mine multiple sources of data, you can find phenotypes of diseases — more specific types of disease — that might be more relevant for the person sitting in front of you," said Kho, professor of Medicine and Preventive Medicine, director of the Center for Health Information Partnerships and director of the Institute for Augmented Intelligence in Medicine. "Then you can precisely target therapeutics that would affect that person in front of you."

Engineering solutions for healing

The field of engineering might not seem compatible with life and medicine, said Guillermo Ameer, PhD, but engineers are helping turn regenerative medicine "into a reality." Ameer discussed his group's advances in regenerative engineering and how new smart regenerative systems can improve outcomes of surgery.

"Historically, regenerative medicine relied on biology or biochemistry — the life sciences side of wisdom or knowledge," said Ameer, the Daniel Hale Williams Professor of Biomedical Engineering at the McCormick School of Engineering, professor of Surgery and founding director of the Center for Advanced Regenerative Engineering. "Within the past two decades, we saw engineers step in and demonstrate that, by bringing disparate fields into the picture, we can significantly improve the chances of making these therapies a reality."

Electrical insights

To close the panel, John Rogers, PhD, showed multiple wireless, wearable, biocompatible devices that his team has developed in the laboratory to continuously monitor health.

"Our goal is to develop new platforms that can be used to develop new insights into fundamental processes in biological systems as research tools but ultimately as new platforms for clinical medicine and patient care," said Rogers, the Louis Simpson and Kimberly Querrey Professor of Materials Science and Engineering, Biomedical Engineering and Neurological Surgery at McCormick and Feinberg and the director of the Querrey Simpson Institute for Bioelectronics. "We want to improve outcomes and reduce cost."

Read the full story or watch the event recording here.

Campus Events

Friday Nights at the Dearborn Observatory
Friday nights from 9:00 to 11:00 p.m.

The Dearborn Observatory is open for public viewing every Friday night from 9:00 to 11:00 p.m. during the spring and summer months (April through September). The sessions are free and open to all. Reservations are required for the first hour, but walk-ins are welcome in the second hour. All visitors should note that the dome is neither heated nor air-conditioned so please dress appropriately. Friday sessions are held "rain or shine." Unfortunately, the Dearborn is NOT ADA-accessible. Several staircases must be climbed to reach the telescope.

Dearborn Observatory
2131 Tech Dr., Evanston
More information

Global Food Allergy Prevention Summit 2023
July 7, 9:00 a.m. to 8:00 p.m.

Center for Allergy and Asthma Research (CFAAR) invites clinicians, researchers, scientists, key thought leaders and industry partners to join a unique and collaborative opportunity focusing on food allergy and related atopic disease prevention. Key topics include maternal diet and breastfeeding practices, early food introduction and diet diversity, immune development, microbiome and epithelial barriers structure and function, genetics and epigenetics, metabolomics and transcriptomics, and secondary prevention through early treatment.

Simpson Querrey Biomedical Research Center
303 E. Superior St., Chicago
More information

Current Issues in LGBTQ Health featuring Diane Chen, PhD
July 20, Noon to 1:00 p.m.

The Institute for Sexual and Gender Minority Health and Wellbeing is delighted to invite you to "Current Issues in LGBTQ Health" series. This event will feature affiliate faculty Diane Chen, PhD. The title of her presentation is "Examining the Evidence Base for Gender Affirmative Care for Transgender Youth." The objectives include introducing the gender affirmative model of care and how it has changed over the last decade, highlighting current gaps in research related to pediatric gender healthcare, and sharing ongoing research from the Trans Youth Case Study – the psychosocial outcomes following two years of treatment with gender-affirming hormones.

625 N. Michigan Ave., Suite 1400, Chicago
More information

TB in South Africa: From Gender Equity to Case Finding and Diagnostics | IGH Seminar Featuring Andrew Medina-Mario
July 26, 1:00 to 2:00 p.m.

Please join us for the July Robert J. Havey, MD Institute for Global Health Seminar, an in-person event featuring Andrew Medina-Mario, PhD. His talk is titled "TB in South Africa: From Gender Equity to Case Findings and Diagnostics. A boxed lunch will be provided.

Gray Seminar Room
Robert H. Lurie Medical Research Center
303 E. Superior St., Chicago
More information

Research in the News

***New York Times*, May 8**
The Most Effective Way to Get Through to Parents Who Won't Vaccinate Their Kids
Marie Heffernan, PhD, was featured.

***CBS News*, May 10**
Sleep Apnea, Lack of Deep Sleep Linked to Damage in Brain, Study Says
Kristen Knutson, PhD, was featured.

***TIME*, May 15**
The Pandemic Didn't Really Change How Americans Think About Sickness
Thomas McDade, PhD, was featured.

***LA Times*, May 16**
Study Reveals Toll of Being Black in U.S.: 1.6 million Excess Deaths over 22 Years
Clyde Yancy, MD, MSc, was featured.

***The Wall Street Journal*, May 22**
Ozempic: How the Diabetes Drug Works and Why It's Such a Big Deal for Weight Loss
Robert Kushner, MD, was featured.

***USA Today*, May 30**
SIDS Cause Remains a Mystery. Scientists Think They May Have Found a Promising New Clue
Debra Weese-Mayer, MD, was featured.

Developing Individualized Therapies and Enhancing Clinical Trials for Cancer Patients

Mohamed Abazeed, MD, PhD, associate professor of Radiation Oncology

Mohamed Abazeed, MD, PhD, is an associate professor of Radiation Oncology and the co-leader of the Lung Cancer Program in the Robert H. Lurie Comprehensive Cancer Center of Northwestern University.

A physician-scientist, his clinical focus is improving the management of patients with lung cancer and his research aims to develop methods and information capabilities that advance more individualized cancer treatments.

What are your research interests?

Cancer, in part due to its extensive heterogeneity, is quite adept at resisting our therapies. Our lab seeks to catalogue features of cancers that can reliably help bind individual patients to particular therapies or therapeutic strategies, thereby optimizing their clinical outcomes. Fundamentally, we search for clinical, imaging and biological (e.g. gene mutations, epigenetic states, etc.) determinants that can reliably predict the likelihood of responses to anti-cancer therapies. We use clinical data, human-derived biological specimens, high-content technology and computation to bring these new information capabilities into the clinic.

What is the ultimate goal of your research?

As a physician-scientist, my mission is to treat the sick and investigate their diseases. As a medical system, we do an excellent job of providing the best in the standard of care, which is reflected in our national rankings. However, providing the standard of care is all too frequently not good enough. The extent of our knowledge is often not sufficient to help a significant number of patients that walk through our hospital doors. We need to do more. Our patients come to us because we pioneer and provide the latest medical breakthroughs. My research program seeks to bring new life-saving treatments to our patients and to facilitate the next breakthroughs in medicine and the allied fields.

How did you become interested in this area of research?

As an MD/PhD student at the University of Michigan, I performed genetic and biochemical research in the Fuller laboratory. I studied membrane protein trafficking using the model organism *S. cerevisiae*. The most enduring influence of my years in Ann Arbor was my training in my mentor's lab. Dr. Fuller was a former graduate student in the laboratory of Arthur Kornberg, who was the leading DNA enzymologist of his era. Their work together was elegant and the training ethos in the laboratory was that of scientific rigor and precision in a way that I had not experienced. My efforts led to the development of new *in vitro* system that reconstituted cellular protein trafficking. On an elevated view, we took a complicated cellular process and made it experimentally tractable by reconstituting it in a plastic tube. In addition to being really cool, it taught me the great value of developing facile assays and systems to resolve complex cellular processes, foreshadowing my current work in integrative cancer genomics.

As a result of experiences with cancer patients during my medical training, I pursued additional clinical training in radiation oncology at the Harvard Radiation Oncology Program. During my residency, I was struck by the heterogeneity in responses observed in patients receiving radiation treatments, which was particularly evident in lung cancer. I also had a front row seat into the development of the kinase inhibitors erlotinib and gefitinib, and the translational science demonstrating their effectiveness mainly in patients with EGFR mutations. I was drawn to the lung cancer programs at both the Dana-Farber Cancer Institute and Massachusetts General Hospital, and I was very fortunate to meet excellent mentors in both programs. Given the success in identifying new therapeutic targets in lung cancer and in translating these findings into clinical trials, I saw this as a great opportunity for a physician-scientist in radiation oncology.

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

Our current efforts are focused on improving therapies for patients with lung cancer, with the ultimate goal of launching new investigator-initiated genomic and augmented intelligence clinical trials. As one imagines, the expertise needed to bring these projects to a clinical trial necessitates a wide scope. It includes know-how in cancer biology, genetics, functional genomics, bioinformatics, machine learning, computational biology, image analysis, translational science and the conduct of clinical trials, to name a few. It has been immensely helpful to have had experiences in these domains, with varied levels of immersion. I rely on a team of talented colleagues and collaborators, at various levels of experience, that have or are developing complementary expertise instrumental to propelling us forward. At Northwestern, we collaborate with investigators within the Institute for Augmented Intelligence in Medicine, the Center for Collaborative AI in Healthcare, the McCormick School of Engineering and the Master of Science in Artificial Intelligence program. Beyond Northwestern, we collaborate with UCSD, Case Western Reserve University, MD Anderson Cancer Center, the University of Toronto/Princess Margaret Hospital and the University of Glasgow.

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Understanding How Cancer Evades the Immune System

Grace Foley is a third-year PhD candidate in the Driskill Graduate Program in Life Sciences. As her interest in science grew during high school, she found herself drawn to the fields of oncology and women's health.

Now, Foley identifies and studies the genetic and epigenetic variants that contribute to racial disparities among endometrial cancer patients in the laboratory of Julie Kim, PhD, the Susy Y. Hung Research Professor in Reproductive Science in Medicine. Her work focuses on understanding these disparities and uncovering methods to improve patient outcomes.

Where is your hometown?
I am from Burington, North Carolina. I went to college in Raleigh, North Carolina at North Carolina State University where I studied genetics and English.

What sparked your interest in science or medicine?
I had an amazing chemistry teacher in high school who really sparked my interest in science. I didn't have a knack for it at first, but he worked with me and eventually I really enjoyed learning about how things work. It felt like he was putting together puzzle pieces in my head, making everything click.

What are your research interests?
I am passionate about oncology and women's health, which may seem like dichotomous interests. Oncology may be one of the most studied topics in research, while women's health is definitely understudied. However, I really believe that there is a lot of overlap in these two fields, especially when it comes to therapeutics and biotechnology that can be used to address these challenges.

What are you currently working on?
My thesis project aims to understand how uterine cancer evades the immune system. I work on an aggressive subtype of uterine cancer, called serous endometrial carcinoma (SEC). This type of tumor does not respond well to traditional chemotherapy and has a five-year survival rate of less than 50 percent. SEC avoids detection by the immune system by polarizing immune cells to an immunosuppressive state and keeping anti-tumor immune cells out of the tumor body. By understanding why this type of tumor is so aggressive and how it outsmarts immune cells, we may be able to design therapeutics that address its specific weaknesses, and ultimately save lives.

Please tell us about a defining moment in your education at Feinberg thus far.
One of the coolest moments I've had at Feinberg was at the Immune Assessment Core (IAC). They have imaging technology that allows me to see the location of most immune cells within a tumor. The first time I was able to see the full distribution of immune cells throughout a uterine tumor was surreal. It was so cool to finally understand how the tumor and immune cells interact spatially.

What do you hope to do with your degree?
I would like to continue to push technology forward that saves lives. I have loved being in the lab, contributing to the basic research that all technology innovations are based on. I hope to further contribute by being on the cutting edge of biotechnology, working with companies to get promising drugs through early-stage development and clinical trials. I also hope to bring more awareness and resources to technology that can improve the lives of women.

Mohamed Abazeed *(continued from previous page)*

How is your research funded?
In addition to NIH funding (R37 and U01), our team's focus on clinical technologies has also led to commercial interest in our work. We have experience in technology entrepreneurship and digital implementation science. Our team currently collaborates with Siemens Healthcare, USA and Bayer AG for the purpose of commercializing intellectual property developed by or co-developed with our team. These efforts are in line with our goals to develop a pipeline of new digital and gene-based technologies and to translate these technologies to the clinic.

Who inspires you?
My teachers: Ms. Sirhan (4th grade) for her kindness, Mr. Davis (6th grade) for his toughness, Ms. Makled (8th grade) for suggesting that perhaps I was not cutout for medicine, Dr. Fuller (PhD) for teaching me the foundation of good science, and Dr. Matt Meyerson (post-doctoral training) for allowing me to be a part of his incredible team, whose members I consider close colleagues and friends to this day.

Supporting Sponsored Projects for Investigators

Kelly Hamm-Oscar is a research administrator in the Basic Science Administration (BSA). After hearing about the opportunities available at Feinberg, Hamm-Oscar joined the research enterprise from the University of Chicago.

At Feinberg, Hamm-Oscar oversees proposals, budgets and projections for the Department of Neuroscience, the Department of Biochemistry and Molecular Genetics (BMG) and the Department of Microbiology-Immunology.

Where is your hometown? Chicago.

What led you to Northwestern?
I came to Northwestern from the University of Chicago. A former co-worker of mine had come to Northwestern as a research administrator from UChicago and told me about the opportunities here at Feinberg and the work they were doing. I was intrigued and excited about what she shared, so I told her I was interested, came in for an interview and the rest is history.

How does your work support the research enterprise at Feinberg?
I support the development, review, implementation and management of sponsored projects for several faculty members in BMG, Microbiology-Immunology and Neuroscience. I support my PIs and their lab members by assisting them with their pre- and post- award activities. I also assist in proposal planning, budget projections and in any other way I can which allows them to focus on their research and goals instead of the day-to-day administrative duties.

Why do you enjoy working at Northwestern?
I enjoy working at Northwestern for many reasons. I enjoy the amazing people I have the pleasure of working with, collaboration with PIs, other departments, and institutions with pre and post award activities. I love the support I consistently receive from others here at BSA and other departments. I think Northwestern is a great school, good environment and place to work and grow. The knowledge I've gained, personal connections made, stories shared and relationships built during my time here is irreplaceable and I'm grateful for the experience.

What do you do outside of work?
Outside of work, I'm ABD, all but dissertation, for my PhD degree in Community Psychology at National Louis University. I love working with youth and seniors and want to make an impact in communities in those groups. I'm very concerned about the current issues that plague our beautiful city. My interest is to bring about change by being the voice that advocates change by working with programs and people who are dedicated to providing invaluable information, resources, education reform and much needed support to make a difference and help others to develop, improve and thrive.

New Faculty

In February 2023, Irum Khan, MD, joined Feinberg as associate professor of Medicine in the Division of Hematology and Oncology and director of Diversity Programs in Hematologic Malignancies at the Lurie Cancer Center. Her research focuses on leukemia disparities and targetable mechanisms of resistance. Previously she was faculty at the University of Illinois at Chicago and was involved in translational oncology research at the University of Illinois Cancer Center. She received her medical degree from Aga Khan University Medical College in 2003. She completed her residency at the University of Cincinnati Medical Center/College of Medicine in 2008 and did a fellowship at McGaw Medical Center of Northwestern University in 2012.

Podcast

Why Late-Night Eating is Linked to Weight Gain and Diabetes with Joseph Bass, MD, PhD

Disrupting our internal clocks can lead to diseases such as obesity and diabetes. Scientists at Northwestern have uncovered the mechanism behind why late-night eating is linked to weight gain and diabetes. Joseph Bass, MD, PhD, led the study published in the journal *Science*. He shares the results and details the two decades of work leading to this latest discovery. Bass is chief of the Division of Endocrinology, Metabolism and Molecular Medicine in the Department of Medicine.

Listen to the episode here.

NIH News

Progress Towards Ensuring Equity and Opportunity in Biomedical Research

The UNITE-E Committee recently updated the research community on their progress towards creating a "multipronged strategy to advance racial equity and create the most inclusive biomedical research environment possible."

Co-chairs Drs. John Lorsch, Ericka Boone, and Anna Ordóñez spotlighted several new UNITE-E led programs centered around:

- Enhancing the breadth and geographical location of research and research-related activities supported by the NIH
- Purchasing modern, scientific instrumentation to enhance research capacity and educational opportunities at resource-limited institutions
- Helping institutions with limited resources assess their research capacity building needs and develop action plans to meet those needs
- Recognizing academic transformative cultures, systems, projects and processes to promote inclusive excellence and create environments that foster and value a culture of diversity, equity, inclusion and accessibility (DEIA)

More Early Stage Investigators Supported in FY 2022

Over the past two years, NIH supported 1,412 early stage investigators (ESIs) in FY 2020 and 1,513 in FY 2021, which were both all-time highs. NIH has just announced that even more ESIs were supported in FY 2022, as part of the continued Next Generation Researchers Initiative (NGRI) efforts. The hypercompetitive funding environment for instance, which was one of the reasons they launched the Next Generation Researchers Initiative, still exists and continues to affect researchers early in their career. As we move forward, the focus will remain working towards expanding opportunities like these that support and prioritize researchers early in their career and further diversifying the future research workforce.

Safeguarding Integrity and Collaborations: Not "Either-Or" but "Both-And"

NIH has shared their perspectives to address long-standing foreign interference threats. These are the main points the NIH makes in their letter featured in *Science*:

- The NIH began addressing foreign interference concerns in May 2016, long before the Department of Justice launched its entirely separate "China Initiative."
- They understand concerns about racial, ethnic or political targeting. The disproportionate number of cases (which altogether account for < 1% of all NIH-funded principal investigators) linked to China likely stem from the extensive reach of Chinese talent recruitment programs, which explicitly target ethnic Chinese scientists.
- There should be no conflict between rigorous integrity oversight and international collaborations. This is a false dichotomy. As NIH wrote, "Proper collaborations do not entail stealth employment, duplicative funding, undisclosed financial conflicts of interest or the repeated recitation of lies to institutional or government officials." These behaviors, which deny funding to scientists who act with integrity, have often occurred at the instigation of foreign talent recruitment programs.

NUCATS Corner
Clinical and Translational Sciences Institute

NMEDW Pilot Data Program

The Northwestern Medicine Enterprise Data Warehouse (NMEDW) Pilot Data Program is an initiative to help less-established investigators jump-start unfunded research projects. The goal of the NMEDW Pilot Data grant is to provide these investigators with feasibility or early pilot data so they may seek sustained funding. The grant provides EDW analyst time to obtain data in support of a project proposal. Any subsequent EDW work should then be funded by an external grant.

Eligibility and Pre-Requisites

Eligibility is limited to investigators who lack other funds to cover early-stage data analysis. This grant may not supplement or expand projects which are already funded. This grant will not fund entire research projects.

Application Considerations

The following things should be considered by the investigator when submitting:

- The scope of the data being requested should be limited or targeted so that the number of analyst hours falls within a reasonable range.
- An average NMEDW data request takes eight to 12 hours of analyst time. Though we will consider exceptions, expect any awards to fall somewhere within this range.
- The turnaround time for submissions is subject to the availability of analyst time. Requests will be considered in the order in which they are received. Please consider this and allow adequate lead time before any deadlines.
- Seed grant funds are limited. Funding is not guaranteed.

Application Process

Learn more and submit your application for the NMEDW Pilot Data Program. For additional information, email Dan Schneider.

Sponsored Research

PI: David Mohr, PhD, **director of Center for Behavioral Intervention Technologies (CBITs), chief of Behavioral Medicine in the Department of Preventive Medicine and professor of** Preventive Medicine (Behavioral Medicine), Medical Social Sciences **and** Psychiatry and Behavioral Sciences

Sponsor: National Institute of Mental Health (NIMH)

Title: Multidisciplinary Training Program in Digital Mental Health

This application proposes to establish an innovative, multi-disciplinary postdoctoral research training program focused on digital mental health and technology across Feinberg School of Medicine, School of Communication and McCormick School of Engineering. The long-term goal of this program is to develop the field of digital mental health by providing the first NIMH-supported postdoctoral training program that integrates mental health (psychology, psychiatry and behavioral science) and human-computer interaction (HCI; computer science, communication, engineering, design and human factors) aimed at producing successful, independent investigators who will become leaders in this emerging field.

Digital mental health as a field has not lived up to its potential to deliver mental health care cost-effectively to large numbers of people. Part of this failure is due to the largely siloed approach to research and training. This program will recruit a mix of fellows in clinical research and HCI. Fellows will develop core competencies in digital mental health, team science, research ethics, leadership, as well as other topics as needed such as implementation science or computer science. Fellows will also develop a working understanding of the methods and principles in the domain that the fellow is learning (e.g. behavioral science for HCI Fellows, HCI design methods for mental health specialists).

Each trainee will be co-mentored by a faculty member who specializes in clinical mental health research and one specializing in HCI. At least 75 percent of the fellow's time will be spent in mentored research. These research experiences will be complemented by a weekly seminar, professional development activities, problem-based learning and workshops and other didactic experiences to cover basic knowledge. Fellows will also have access to the rich educational resources made available by Northwestern, including training in grant writing workshops, paper writing seminars, team science training, and other resources dedicated to career development. Our participating faculty mentors and advisors are leaders in their respective fields and come from nine departments across three schools. We will admit three fellows each year for a two-year fellowship. This program will be the first in the nation to jointly train mental health and technology specialists and will serve as a model for the emerging field of digital mental health.

Read more about the project.

PI: Michelle Birkett, PhD, **assistant professor of Medical Social Sciences and Preventive Medicine**

MPI: Patrick Janulis, PhD, **assistant professor of Medical Social Sciences**

Sponsor: National Institute on Drug Abuse

Title: Network Canvas 2.0: Enhancing network data capture for drug use and HIV research

Over the last two decades, a growing literature has demonstrated that social factors drive both drug use and infectious diseases such as HIV. Simultaneously, epidemic modeling has become vital for reducing the spread of HIV, as it allows insight into mechanisms of spread, forecasts future incidence and provides guidance on effective intervention strategies. However, despite all their power and complexity, these epidemic models still often lack realistic social data, as network and contextual data reflective of the most at-risk populations are often deemed too methodologically challenging to capture.

In line with the urgent need for data capture tools which enable investigators to understand the social context around the most at-risk populations, our interdisciplinary team has developed a free, open-source, NIH BD2K-funded software suite called Network Canvas (R01DA042711). While Network Canvas has already substantially improved the ability of investigators to quickly and accurately capture complex network and contextual data, to be useful for HIV elimination, our existing tool requires optimization to further improve its timely and broad reach to the most at-risk populations, as well as enhancements that will modernize the tool to better meet the needs of epidemic modelers. In particular, we must transition Network Canvas to a hybrid cloud model, developing a cloud-based software platform that will enhance the ability of investigators to robustly capture data remotely and at scale, as well as reach the most essential but hard-to-reach populations. Additionally, we propose user-engagement and evaluation activities to inform the software's design and rigorously evaluate its value and impact on the measurement of networks relevant to epidemic modeling and HIV.

Led by principal investigators Birkett and Janulis and supported by an interdisciplinary team at Northwestern University (Gregory Phillips II, Noshir Contractor, Joshua Melville, Kate Banner) and University of Oxford (Bernie Hogan), this project aims to: 1) Enhance data reproducibility, timeliness and measurement for investigators; 2) Enhance the availability and accessibility for study participants; 3) Rigorously evaluate the tool's impact on the measurement of sexual and drug networks. This work will result in both an enhanced free and open-source tool and an increased scientific understanding of the value and impact of the tool for capturing crucial data relevant to HIV and drug use. Finally, just as we have done over the last five-year period, this project will employ a strong plan for user engagement where we build partnerships with and actively employ iterative feedback from relevant research communities to shape software features and functionality. Feedback would be sought widely - from our highly accomplished Scientific Advisory Board (SAB); from our collaborative pilot partnerships with investigators who hold strong NIH-funded drug use, HIV, and epidemic modeling research portfolios; and from at-risk populations themselves. This development approach is key in ensuring community buy-in, accelerated adoption, and long-term sustainability of our tools.

Read more about this project.

Funding

Seed funding has increased up to $50,000 for application preparation to initiate new multi-investigator program project or center grant applications involving Feinberg faculty. Learn more on the website here.

Alcohol Treatment and Recovery Research (R34 Clinical Trial Required)

More information

Sponsor: NIH, National Institute on Alcohol Abuse and Alcoholism (NIAAA)
Deadline: July 19
Upper amount: $225,000 per year

The National Institute on Alcohol Abuse and Alcoholism solicits applications for an R34 Clinical Trial Required mechanism focusing on alcohol treatment and recovery research. This NOFO will focus broadly on topics relevant for treatment of and recovery from alcohol use disorder (AUD), including: medications development, precision medicine, behavioral therapies and mechanisms of behavioral change (MOBC), recovery, translational research, and innovative methods and technologies for AUD treatment and recovery. Although recent data show that U.S. adolescents in general are drinking less alcohol, when they do drink, they consume alcohol in ways that are particularly harmful. Many young adults are also drinking heavily, and experience myriad associated negative consequences. These include an increased risk for alcohol overdose, blackouts, falls, drowning, unplanned sexual encounters, intimate partner violence and co-occurring mental health conditions. Epidemiological data clearly show an association between early onset of drinking (particularly before age 14) and later alcohol-related problems. Finally, research also shows that alcohol may cause changes in the developing brain. Because the human brain continues to develop past adolescence and into young adulthood, young people are at particularly high risk for experiencing alcohol-related harms. Future research needs to examine whether alcohol-related brain changes occurring in adolescence and young adulthood have long-term consequences. Research also needs to examine how treatment strategies can be better tailored to this special population.

HIV Prevention and Alcohol (R34 Clinical Trials Optional)

More information

Sponsor: NIH, National Institute on Alcohol Abuse and Alcoholism (NIAAA)
Deadline: August 7
Upper amount: $225,000 per year

The funding opportunity seeks to expand the HIV/AIDS prevention toolkit among alcohol impacted populations with a range of patterns of episodic and long-term use and associated behavioral and biological risks for HIV acquisition. This includes integration of effective prevention and treatment interventions with an understanding of the overarching framework for reducing the incidence of new infections by facilitating cross-cutting informative research. In this NIAAA funding opportunity for pilot clinical trials the R34 mechanism is intended to provide new information that answers a scientific or operational question(s) which may be pragmatic in nature and, therefore, informs the final development of a clinical trial and testing of intervention tools.

Precision Mental Health: Develop Tools to Inform Treatment Selection in Depression (UG3/UH3 Clinical Trial Optional)

More information

Sponsor: NIH and NIMH
Letter of intent: September 18
Upper amount: $500,000 per year

There is an urgent need for tools that integrate pre-treatment measures to predict whether a depressed individual will have a differential therapeutic response to a specific treatment and aid clinicians in selecting among multiple available treatments. The goal of this funding opportunity is to create a pipeline to support initial tests of validation and feasibility of objectively easy-to-use, and widely accessible tools for predicting response to depression treatments at the level of the individual. Investigators will receive consultation, access to resources, and support from teams of experts with clinical, scientific, technical, regulatory and commercialization expertise.

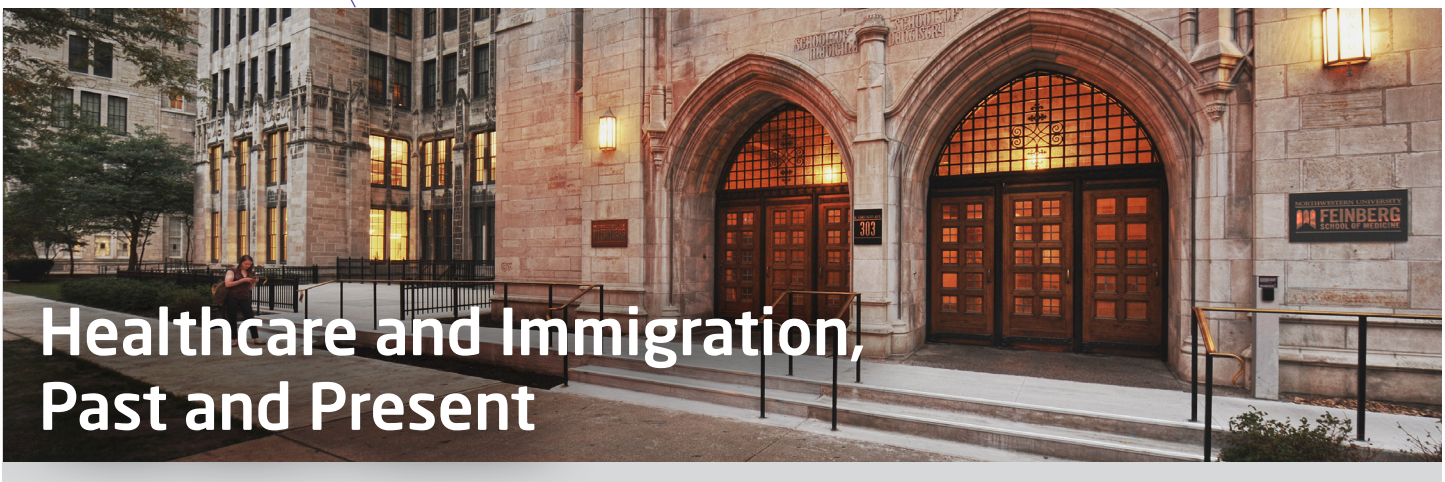
Mechanistic Investigations into ADRD Multiple Etiology Dementias (R01 – Clinical Trial Not Allowed)

More information

Sponsor: NIH, National Institutes of Neurological Disorders and Stroke (NINDS), National Institute on Aging (NIA)
Deadline: October 4
Upper amount: $500,000 per year

Goal 1 of the National Plan to Address Alzheimer's Disease is to prevent and effectively treat Alzheimer›s disease (AD) and Alzheimer's Disease Related Dementias (ADRD) by 2025. More knowledge is needed around what are triggering events and what are distinct, convergent, and synergistic mechanistic pathways and interactions. This NOFO is to support research into these cellular and molecular mechanisms and spatiotemporal sequence of events of ADRD co-pathologies that drive worsening pathophysiology and how and whether these lead to enhanced cognitive, behavioral and/or functional deficits and dementia. The goal is to determine at a molecular level how co-pathologies affect these disease processes and events and how they causally accelerate disease progression and exacerbate phenotypic outcomes.

Read more about the innovative research and discoveries and browse the stories of our outstanding students, faculty and staff in the Feinberg News Center.



Healthcare and Immigration, Past and Present

By Verónica Hoyo, PhD, Executive Director, NNLM | National Evaluation Center

Galter Health Sciences Library and Learning Center recently hosted the National Library of Medicine's (NLM) traveling exhibit Outside/Inside: Immigration, Migration, and Health Care in the United States. Through a series of standing posters and a companion website, the exhibit offered an opportunity to trace the healthcare experiences of different immigrant communities over the last 130 years, providing essential context to understand how immigrants have advocated for their own health and rights throughout U.S. history. From public health campaigns to the establishment of hospitals, clinics and services, immigrants have been a catalyst for social reforms that significantly impact the medical landscape and promote health equity, regardless of nationality, citizenship or immigration status.

In an effort to foster conversations through the NLM exhibit, Galter Library developed a series of accompanying events, including a "Read and Discuss" event centered on the "Access and Empowerment" learning module in the exhibit hosted by Galter's Diversity, Equity and Inclusion (DEI) Workgroup; an internal symposium highlighting library efforts in support of immigration, health disparities and DEI; and a GalterGuide on immigrant health, forced migration, and refugee studies, among other topics.

The Galter Special Collections Working Group also curated a companion display of local materials on immigrant health to complement the NLM exhibit and was displayed in the Eckenhoff Reading Room. Born from the Galter collection, it focused on public health instruction and curriculum on the influence of the arrival and growth of diverse immigrant communities beginning in the 1880s. Medical initiatives of faculty and students that impacted immigrant health at Feinberg School of Medicine and its predecessor, Chicago Medical College, were also featured. Each of the four curated cases was centered around a specific aspect of immigrant health: Avenues of Care, Public Health Department, Public Healthcare in Medical Schools and Infectious Diseases.

The exhibit culminated in a panel conversation about the intersection of immigrant health, policy and healthcare access by experts in health equity, immigrant and refugee rights and immigration law. Luvia Quiñones, MPP, Uzoamaka Emeka Nzelibe, clinical professor of Law, and Namratha R. Kandula, MD, MPH, guided the audience in a compelling dialogue about the current state of health rights, benefits and services available to all in the Chicagoland area. The importance of using appropriate terminology when referring to different migrant populations (e.g., immigrants vs. displaced persons) was discussed, as was the importance of understanding that each of these groups (e.g., undocumented immigrants, refugees, asylum seekers) faces distinctive challenges and barriers when it comes to healthcare access and rights. The combined existence of an "immigrant health paradox" was addressed, including how acculturation issues, racialized legal status and state violence have a direct implication on the health status of individual migrants. The panelists offered individual perspectives on lessons learned from the COVID-19 pandemic, the historical role of hospitals in immigrant healthcare, and whether immigration should be a "social determinant of health." One key conclusion from this panel conversation was the urgent need to provide migrant communities with information and for that information to come from a "trusted source." Attendees to this hybrid event left with carefully vetted, multilingual resources available in our local community.

Attendee Feedback

"The seminar opened my eyes to the struggles of immigration in the United States. I knew there were nuances that I was missing from only reading news stories. The speakers, even the short amount of time they had, provided a very educational experience. I found it heartbreaking and inspiring, and I haven't stopped thinking about it since."

"Each speaker provided excellent information about the groups they work with. We have a long way to go to make health care accessible for all."

"Feel more informed on resources available to people with different statuses. Learning about research and work done by NU faculty related to immigration and health."

High-Impact Factor Research

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Discovery *(continued from page 2)*

Empowering Independent Discovery

The Robert H. Lurie Comprehensive Cancer Center Flow Cytometry Core Facility was established to serve investigators whose studies require the measurement of select characteristics of intact cells in a mixed population or in isolation.

"Our users are heavily dependent on the instrumentation we offer, which are all very sophisticated and specialized instruments," said Suchitra Swaminathan, PhD, research associate professor of Medicine in the Division of Rheumatology and director of the Flow Cytometry facility. "We offer all different kinds of instruments for flow, starting from the very basic, which can do a one-color assay to instruments that can do 30 or 40 colors as well."

The Flow Cytometry facility is currently home to five high-end cell sorters, including a five-laser 50-parameter cell sorter, two mid-level cell sorters and five high-end cell analyzers with 14-28 color capabilities, including one small particle analyzer. The equipment can be used for anything from routine flow cytometry assays, like phenotyping, to more complex, high-parameter and multi-laser measurements, including cell surface and intracellular analysis.

This summer, the facility will add more equipment to its lineup that allows for cell sorting and analysis at the same time, Swaminathan said.

While the facility provides free consultations, technical assistance and experimental design help, trained investigators are also welcome to operate the equipment on their own. Because so many investigators undergo training at the facility, it has operated 24/7 for the past four years, increasing the facility's capacity and allowing scientists to perform cell sorting and flow cytometric analyses whenever their experiments demand it.

"I think ours is a very heavily utilized facility with lot of cutting-edge instruments, as well as the services we offer including staff consultations. In addition, we also take on clinical projects. We can help with the validation and optimization of the flow of the [clinical] trial and then sample preparation, longitudinal data acquisition as well as analysis. For a lot of the clinical-oriented research groups that don't necessarily have a lab of their own, we are prepared to assist."

Learn more about the more than 30 Cores here.

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Thanks for reading *Breakthroughs.* In August, we are trying out a new, updated format of the *Breakthroughs* newsletter. You will receive it via email.

As this rolls out, we welcome your feedback and experience with the new format. Please don't hesitate to reach out with your thoughts. You can email fsm-research@northwestern.edu. Your feedback will help shape the future of our monthly research newsletter.

PODCAST: New Institute Advances Lung Disease Research and Clinical Care with Scott Budinger, MD

The launch of the Simpson Querrey Lung Institute for Translational Science (SQLIFTS) aims to expedite the discovery and implementation of innovative lung disease treatments through a patient-centered, bedside-to-bench-to-bedside approach. In this episode, Scott Budinger, MD, the new executive director of the institute, discusses its launch and how it aims to transform lung disease research and clinical care.

Listen to the episode here.