

Breakthroughs

Feinberg School of Medicine Research Office

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The CAPriCORN initiative, co-led by Abel Kho, PhD, aims to build a city-wide system of electronic health record sharing in Chicago and engage patients in research.

Linking Electronic Health Records Across Chicagoland

The lack of scientific evidence needed to support healthcare decisions made by patients and their doctors has become an increasing problem.

Aiming to tackle this issue, [Abel Kho, MD](#), and his team at Northwestern collaborated with other Chicago area institutions to create the Chicago Area Patient Centered Outcomes Research Network (CAPriCORN) to build a city-wide system of electronic health record sharing.

"We are one of two networks in the nation that cover a whole city," says Kho, assistant professor of [Medicine-General Internal Medicine and Geriatrics](#) and [Preventive Medicine-Health and](#)

[Biomedical Informatics](#). "We have an opportunity as the third largest city in the country to be a leader in taking advantage of existing data in whole population research."

This project stemmed from the National Patient Centered Outcomes Research Network (PCORnet). Funded by Patient Centered Outcomes Research Institute (PCORI), the initiative supports a national research infrastructure to advance the use of electronic health data in research studies.

At the beginning of the year, PCORI funded 11 clinical data research networks and 18 patient-powered research networks for 18 months. The active collaboration of the CAPriCORN health

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Linking Electronic Health Records Across Chicagoland

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system has allowed it to become one of the largest clinical data research networks in PCORnet.

Building a Research Network

Over the next 18 months, CAPriCORN will capture patient information to develop the ability to conduct comparative effectiveness research trials and observational studies. Prior to the \$7 million PCORI grant, Kho's group had already developed a novel software system that enables merging of de-identified patient information across institutions in Chicago.

Building on this technology, an expanded informatics working group spanning CAPriCORN institutions can search patient data across other CAPriCORN sites to identify groups of patients of interest for a variety of research. Scientists can also use this software to better identify and recruit study subjects, and to use as a database for disease mapping throughout Chicago.

"The project allows us to see a population view of the health of a much larger proportion of the city than just one institution," Kho says. "It is very important, especially since we increasingly recognize that taking a single-site, reactive approach to health-care isn't working. Here we have a chance to see larger factors that may be influencing health, and then impact those. It's not just one patient, but an individual person living in a much wider environment."

CAPriCORN will establish procedures for clinical data standardization, engage patients and clinicians in governance and the use of the database resources, and characterize, recruit, and survey five patient groups, or cohorts. The five cohorts include patients with asthma, anemia, sickle cell disease, obesity, and recurrent *clostridium difficile*.

To achieve these tasks, the group has begun to standardize a set of electronic health record data (a common data model) across all of the CAPriCORN institutions, which include Rush University Medical Center, University of Chicago Medicine, Cook County



The CAPriCORN team stands with Illinois elected officials at a recent press conference.

Health and Hospital Systems, and the Hines and Jesse Brown Veterans Administration Hospitals. The group has also created an operational central institutional review board (IRB) hosted at University of Illinois at Chicago.

Informatics and Data Privacy

The team at Northwestern is leading the technical development and informatics arm of the project. Kho, who co-chairs PCORI's Data Standards, Security and Network Infrastructure Task Force for PCORnet, collaborated with the Northwestern Medicine Enterprise Data Warehouse team to set up and standardize the Northwestern data set. This enables scientists to conduct queries across sites without having to pull the data centrally.

Over the next year, CAPriCORN's informatics team will work on software to expand coverage from the current seven to all participating institutions. The CAPriCORN data model pulls information such as demographics, insurance status, diseases, and medications.

Collaborating with the wider CAPriCORN informatics working group, Kho's team is helping to identify data standards and technical specifications for data standardization and develop an approach to cross-network queries that meets security, patient privacy, confidentiality, and governance needs.

Patient Centeredness

A large part of the project involves patients in generating research questions and includes them with the development and uses of the network. The CAPriCORN group comprises a patient and clinician advisory committee, and patients and their advocates meet regularly to help generate ideas and give feedback.

"The big idea is to engage patients in research," he says. "Most studies are done with a very focused and defined population, and not a real-world population. We have the ability to take those findings and make them applicable to the general population. Most people don't come in with just one disease and nothing else. They come in with lots of diseases and problems. So we are trying to answer the questions that are important to the patients we see every day."

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Faculty Profile: David Gius, MD, PhD

Professor of Radiation Oncology and Pharmacology



Why are aging and cancer so inherently linked? [David Gius, MD, PhD](#), professor in [Radiation Oncology](#) and [Pharmacology](#), studies the connections between longevity, cellular processes, and cancer development in an effort to understand the answer to this question.

Specifically, his lab focuses on breast cancer and the sirtuin gene family. These silent information regulator genes affect species' lifespans in multiple ways. They help cells repair DNA damage that comes with age and suppress tumor development.

Gius joined Feinberg in 2012 from Vanderbilt University. Previously, he served as associate director of the National Institutes of Health Oxford/Cambridge Scholars Program and as chief of the National Cancer Center's molecular and radiation oncology section. He earned a doctorate degree in molecular genetics from the University of Chicago and his medical degree from Loyola University.

Q&A

What are your research interests?

A fundamental observation in oncology is that the rate of malignancies increases significantly as a function of age, suggesting a potential mechanistic link between the cellular process governing longevity and the development of cancers. In fact, advanced age is the single most important predictive variable for cancer incidence. However, the genetics and murine models to investigate this idea have not been available.

In this regard, the critical genes in longevity (or aging) have recently been characterized in *S. cerevisiae* and *C. elegans*, and the human homologs are referred to as the sirtuin gene family. It has been hypothesized that sirtuin genes may function as fidelity or repair genes, and that loss or decrease of function, which normally occurs during aging, creates an environment permissive for age-related illness, including cancer. There are several common human solid tumor malignancies that have a very strong statistical connection to increased age, including estrogen positive (ER+) breast malignancies.

Mouse models for hereditary triple-negative breast cancer, which is more common in younger women, have been an instrumental tool for the advancement of our clinical and scientific knowledge to combat this deadly disease. In contrast, there are no or very few physiologically relevant murine models for ER+ breast cancers that are more commonly observed in older women. Thus, it seems logical to assume that breast cancers that develop at a later age are more likely to have a genetic or physiological connection to the cellular processes that govern mammalian aging, including the loss of and/or dysregulation of sirtuin proteins.

To address this idea, over the past five years, we have constructed mice that have the three primary sirtuins genetically deleted. These mice develop ER+ invasive ductal mammary (breast) tumors that have the strongest statistical correlation to increasing age.

What is the ultimate goal of your research?

The overarching goal of my research is to use these novel sirtuin knockout mice as *in vivo* genetic models to connect aging genes, intracellular aberrant metabolism, and the mechanisms underlying the development of breast cancer.

The mice that lack *Sirt1* (Wang et al., 2009, *Cancer Cell*), *Sirt2* (Kim et al., 2011), and *Sirt3* (Kim et al., 2010, *Cancer Cell*) each develop breast cancer, and the levels of *SIRT1-3* are also decreased in human breast cancer samples, as compared to normal breast tissues. These mice exhibit altered intracellular and mitochondrial metabolism and develop poorly differentiated ER+ tumors that appear to be very similar to luminal B breast cancers that are commonly observed in older women. Thus, we propose that these murine models can be used to determine the mechanisms for breast cancer development, as well as the identification genetic factors in disease progression. These models would also be used for drug discovery to develop potential new therapeutic strategies for breast cancer.

How does your research advance medical science and knowledge?

One idea of personalized cancer therapy is to identify a specific subgroup of cancer

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David Gius, PhD

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patients that will benefit from specific therapeutic strategy. Murine and human data from our laboratory, started while I was the chief of the molecular radiation biology section at the National Cancer Institute, suggest that there is a subgroup of ER+ luminal B human breast cancer that exhibit partial or complete loss of sirtuin expression. In addition, it appears that roughly 40 percent of all breast cancer patients exhibit a deletion of one of the sirtuin gene, which suggests that loss of these genes may be a key early event in human breast carcinogenesis.

We propose that there are a significant number of women with a sirtuin ER+ breast cancer signature. If correct, this will allow the development of new therapeutic strategies for therapy as well as chemoprevention.

How is your research funded?

My research on breast cancer, which is the primary focus of my laboratory, is funded by two R01 grants from the National Cancer Institute and an Avon Foundation Center of Excellence grant. My laboratory also has an R01 grant to investigate the connection between sirtuins, mitochondrial metabolism, and how human cells respond to cellular stress, including therapeutic irradiation.

Where have you recently published papers?

In 2010, my laboratory published manuscripts in *Cancer Cell* and *Molecular Cell* that showed that SIRT3, the mitochondrial sirtuin, is a tumor suppressor protein and functions as a watchdog or fidelity protein to maintain mitochondrial homeostasis. In 2011, we published a manuscript in *Cancer Cell* showing that the cytoplasmic sirtuin is a tumor suppressor protein, and a letter to the editor in *Science*.

In 2013, we published a manuscript, which was primarily directed and conducted by [Joseph Bass, MD](#), chief of the Division of Medicine-Endocrinology, that showed those circadian rhythms and the proteins that oversee these rhythms direct mitochondrial metabolism via a mechanism involving SIRT3.

Who are your mentors?

When I first started my graduate education I was very fortunate to have one of the University of Chicago's best mentors as my thesis adviser. I think it is safe to say I would not be where I am today without his patience and mentorship. In fact, he is now chairman of Microbiology-Immunology at Northwestern University Feinberg School of Medicine, [Lou Laimins, PhD](#).

Welcome New Faculty

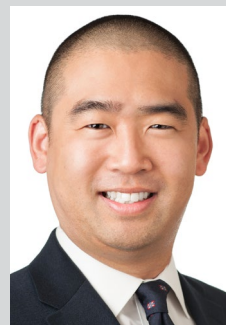


Mojgan Naghavi, PhD, joins as associate professor of Microbiology-Immunology.

She was most recently a Schaefer Research Scholar and associate research scientist in the Department of Biochemistry and Molecular Biophysics at Columbia University, in New York. Prior, she was SFI Principal Investigator at the School of Medicine and Medical Science, Centre for Research in

Infectious Diseases (CRID), University College Dublin (UCD), in Ireland. Naghavi earned her Master of Science and Doctor of Philosophy degrees, both in virology, from the Karolinska Institutet, in Stockholm, Sweden. In addition, she holds a master's degree in cell and molecular biology from the the University of Stockholm, Sweden.

Naghavi's research interests are microtubule regulation and function during infection by Human Immunodeficiency Virus (HIV). She has two active NIH grants and has served as author or co-author on more than 20 papers in peer-reviewed journals.



Anthony Yang, '02 MD, '09 GME, joins as assistant professor of Surgery-Surgical Oncology and the Surgical Outcomes and Quality Improvement Center.

Yang most recently was assistant professor of clinical surgery at the University of California Davis Medical Center in Sacramento, California. Prior, he completed a fellowship and post-doctoral fellowship in surgical oncology at the

University of Texas-MD Anderson Cancer Center in Houston, and his surgical residency at Northwestern Memorial Hospital. Yang received his Doctor of Medicine degree from Northwestern University Feinberg School of Medicine.

His research interests are healthcare quality improvement, patient safety improvement, outcomes research, and oncology quality measurement. His clinical interests include gastrointestinal malignancies, particularly pancreatic and biliary malignancies, and malignant and benign thyroid disease. He has authored or co-authored more than 20 papers in peer-reviewed journals.

Student Profile: Jessica M. Wilson

Northwestern University Interdepartmental Neuroscience Program



Jessica Wilson, a fifth-year PhD student in the Northwestern University Interdepartmental Neuroscience Program (NUIN), studies the neural principles behind human motor control in the laboratory of [Charles J. Heckman, PhD](#), professor of [Physiology](#), [Physical Medicine and Rehabilitation](#), and [Physical Therapy and Human Movement Sciences](#).

Wilson earned her undergraduate degree from Dalhousie University in Nova Scotia, Canada, and completed a 14-month internship in Osaka, Japan. After more than 10 years of studying martial arts, Wilson developed a fascination for understanding the human body and eventually decided to pursue a career in neuroscience.

Q&A

What is your hometown?

I grew up in Ottawa, Ontario, the capital of Canada.

What are your research interests?

I'm interested in the neural principles behind human motor control. Oddly enough, I developed this interest after more than 10 years of studying martial arts; I reached a point in my training where I became fascinated with discovering how the body works. The human body is a complex and beautiful machine. The act of producing the perfect punch, golf swing, or dance step requires the harmonious function of multiple systems that we don't entirely understand yet. I take great pleasure in trying to figure out how those systems come together in different contexts.

But, in general, I find all of neuroscience to be beautiful, and I'm always on the lookout for interesting or quirky neuroscience topics to learn more about.

What exciting projects are you working on?

I currently study motor neuron behavior in humans. Motor neu-

rons can be likened to the "puppet strings" of the body, but they are actually highly dynamic structures that behave differently in response to different neurotransmitters. Serotonin and norepinephrine, for example, make motor neurons extremely excitable and allow them to produce very specific firing patterns. These firing behaviors are critical for the normal control of movement, and abnormalities in these behaviors have been implicated in the motor deficits seen in stroke, ALS, and spinal cord injury.

My thesis work involves looking at motor neuron behavior in healthy individuals as well as people with movement disorders like Parkinson's disease. This involves recording from motor units directly using fine wire electrodes that are inserted into the muscle, as well as through high-density surface electromyogram electrode arrays. I would be lying if I said I didn't feel like a mad scientist most of the time.

What attracted you to the PhD program and Northwestern?

When I visited Northwestern during recruitment weekend, I was immediately struck by the breadth and diversity of neuroscience research across both the Evanston and Chicago campuses. The NUIN family is extremely collaborative and supportive, and is there to help whenever you need it. I had great fun sampling different areas of research during my rotations and learning from some truly great minds. As a bonus, Chicago is a fantastic city. There's great food and soul here, and it's a wonderful place to live and study.

What has been your best experience at Feinberg?

My classmates are the best part of my graduate experience, hands down. We all bonded fairly quickly during our first year in the NUIN program, and we continue to stay in touch even after we split up to our respective labs. We've collaborated, exchanged ideas and advice, and done volunteer work together. My classmates are talented, smart individuals who will make great contributions long after they graduate, and I'm privileged to call them my friends and colleagues.

What do you do in your free time?

I probably have too many hobbies, but I'm extremely passionate about science communication. Early in my graduate career, I acted as a mentor for Northwestern Science and Society's Science Club, as well as co-founded the Northwestern University Brain Awareness Outreach group, a graduate student group dedicated to educating and exciting the public about brain research. Right now I'm trying to dabble in science communication via digital media. I've submitted popular science articles to Northwestern Science & Society's *Helix Magazine*, and made kids' neuroscience videos for YouTube. Science communication is part science, part sales, and part entertainment. It's tons of fun because I get to act like an utter goofball while getting people excited about things I love.

Staff Profile: Jennifer Pacheco

NUgene Informatics Lead



Where are you originally from?

I was born in Connecticut and raised in a small town in southern Indiana.

What is your educational background?

I love learning, so my education is varied, yet it all comes together. I have a bachelor's

degree in computer science, with a minor in psychology, a post-baccalaureate certificate in biology, a graduate certificate in bioinformatics, and now it's all coming together as I'm working on my master's degree in biomedical informatics.

Please tell us about your professional background.

My first job after obtaining my bachelor's degree was as a data mining technology consultant based in Chicago, which was fun—I worked with the latest technology at the time and traveled around the world. After almost five years as a consultant, I settled down and moved to Boston to work as a scientific systems analyst at a pharmaceutical company for a few years. Then I came to Northwestern.

Why did you choose to work at Northwestern?

I was looking at graduate degree programs at Northwestern University and also looking for a simple information technology job at the University to provide some income while I went to graduate school. I came upon the job description for my current position, and when I realized it basically described my dream job, I applied right away. I've been here for nine years now.

What is your role within NUgene?

My main role within [NUgene](#) is to work with scientists at Feinberg and elsewhere to extract phenotypic information from the electronic health record (EHR). I spend most of my time working on the [eMERGE](#) (electronic MEDical Records and GENomics) project, a national consortium of 10 sites with DNA biorepositories linked to EHR data; NUgene is one of those biorepositories. The goal of eMERGE is to use these EHR-linked biorepository data to conduct large high-throughput genetic research studies, and to ultimately return genetic test results to patients.

How do you help scientists at the medical school?

I help researchers select the appropriate subjects and phenotype data for their genetic research studies. First, I help researchers apply for grants to conduct their research by providing them with a concrete idea of the feasibility of their study using

NUgene to help them get funded. Then, I collaborate with them to define and iteratively refine an EHR algorithm for selecting the right subjects, so that I can select case and/or control subjects for their study with the high specificity that is needed to conduct genetic research. Lastly, I mine the EHR and the self-reported health, social, and family history data gathered from NUgene participants in a questionnaire when they enroll; this is the data researchers need from those subjects for their study.

Most of the data I gather comes from the Northwestern Medicine Enterprise Data Warehouse ([NMEDW](#)), which I query directly to mine EHRs for all the information researchers need. Sometimes, the data that researchers need is not easily extracted from the EHR, so I will work with NMEDW team to find it, or if the data is buried in the narrative (such as in the text of a procedure report), I will work with my colleagues, [William Thompson, PhD](#) and [Siddhartha Jonnalagadda, PhD](#), who are experts in natural language processing, to extract data from the text.

What is your favorite part of the job?

I learn so much from the researchers with whom we work. I love learning about their research and the diseases they study. It is motivating to be a part of research that helps patients in one way or another. It is also great to be a part of the eMERGE network, where we are developing best practices in EHR-based phenotyping and the delivery of personalized medicine.

What exciting projects are you working on?

All of the phenotypes I work on with researchers are exciting! It is wonderful to learn something new; I recently learned that infectious disease is a type of phenotype that has a genetic component. Currently I am working on a study of influenza host-pathogen interactions, or fluomics, led by Ellie Sang Sukerman, MD, and a study of the genetic host factors of caMRSA (community associated Methicillin-resistant Staphylococcus aureus), led by my eMERGE colleague who is a medical informatics expert here, [Abel Kho, MD](#).

The other really exciting project I'm working on is the [eMERGE PGx](#) (pharmacogenomics) project led here by my boss, the director of NUgene and co-principal investigator (PI) of eMERGE, [Maureen Smith, MS](#), and [Rex Chisholm, PhD](#), vice dean of scientific affairs and graduate education, Northwestern University associate vice president for research, co-PI of eMERGE and PI of NUgene. This project is pilot testing the return of genetic results for clinical care—in particular, the individual variation in response to different drugs. This means a patient and his or her doctor can know, before even prescribing a drug, whether or not the drug might be the right one for the patient, what the right dose will probably be, and/or whether or not the patient might have an adverse reaction to the drug. This is exciting because it is the future of so-called personalized medicine, and it's happening here now!

Research in the News

USA Today September 23

CDC: Ebola could infect 1.4 million people by January
Robert Murphy was quoted.

The Washington Post September 23

Your gym days are also your booze days, study shows
David Conroy's research was featured.

■ Conroy's research was also featured on NBC's The TODAY Show, in *Time Magazine*, *Chicago Tribune*, Web MD and more.

Chicago Tribune September 19

NU researchers shed light on domestic violence among same-sex couples

Richard Carroll's research was featured.

New York Times September 17

MacArthur Awards go to 21 diverse fellows

Mark Hersam was featured.

■ Hersam was also featured on CBS Chicago, ABC News (national), PBS News, National Public Radio, in the *Chicago Tribune*, *Washington Post*, *Chicago Sun-Times*, *Scientific American*, the Huffington Post, and more.

TIME Magazine September 16

A blood test for depression? Science says it's possible
Eva Redei's research was featured.

■ Redei's research was also featured on CBS News (national), WGN-TV, ABC Chicago, Voice of America, in the *Chicago Tribune*, *Newsweek*, *Fast Company*, *New York Magazine*, WebMD, and more.

US News & World Report September 11

Researchers probe molecular cause for glaucoma
Susan Quaggin's research was featured.

FOX News (National) September 8

Most asthmatic kids lack health management plans at school
Ruchi Gupta's research was featured.

NBC News (National) September 3

Music lessons may boost poor kids' brainpower, study suggests
Nina Kraus' research was featured.

■ Kraus' research was also featured in *USA Today*, *Chicago Tribune*, *US News & World Report*, and more.

[More media coverage](#) available online.

Northwestern University

NUCATS

Clinical and Translational Sciences Institute

NUCATS Corner

eNOTIS Releases New Features & Information Sessions

The Enterprise Open Trial Information System ([eNOTIS](#)), a clinical trial management system that helps improve safety and security for enrolling participants in research studies, has released new features that expand beyond its standard research subject tracking log and billing accuracy tools.

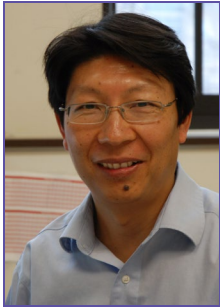
The new features include a built-in study calendar function, data capture form, and a recruitment tool. The study calendar allows you to alert coordinators to important study dates and events/activities so that you can see the upcoming study events as a whole or specific to a participant. The data capture form offers the ability to create customized forms in conjunction with a screening tool.

eNOTIS is a tool that will allow you to centralize your participant tracking, study budget, data capture, and study schedule tracking in one place.

If you are new to using eNOTIS or are interested in learning more about the new features, NUCATS will host [eNOTIS New Features Sessions](#) on the first Wednesday of every month and [eNOTIS Basics Sessions](#) on the fourth Wednesday of every month. These sessions are also offered in effort to help you comply with the Feinberg Dean's Office [Clinical Research Participant Tracking Policy](#).

[Learn more](#) about how NUCATS can help you manage all aspects of your study data from study conception and design, to data collection, through analysis.

Sponsored Research



PI: Deyu Fang, PhD
Associate Professor in Pathology

Sponsor: National Institute of Allergy and Infectious Diseases

Title: "The roles of Synoviolin in immune tolerance and autoimmunity"

The National Institutes of Health estimates that up to 23.5 million Americans suffer from autoimmune diseases, such as multiple sclerosis (MS), and autoimmune disease is one of the top 10 leading causes of death in females. All autoimmune diseases are a consequence of the immune cells attacking self tissues and organs, which should be avoided in healthy by a mechanism known as immune tolerance. Since Sir Frank Macfarlane Burnet first described immune tolerance in late 1950s and received the 1960 Nobel Prize in Physiology or Medicine, tremendous efforts have identified genes that are responsible for T cell tolerance, the molecular mechanisms in particular underlying the peripheral T cell tolerance remain an immunological mystery.

The current dogma is that T cell receptors (TCRs) on self-reactive T cells, upon recognition of self-antigens, promote the expression of genes that suppress the activation of self-reactive T cells (known as anergic genes). However, additional factors have not yet been identified to fully explain the molecular puzzles of T cell tolerance. Similar to a vehicle that can be slowed down by either tightening a brake or shutting off the gas, Fang posits that, in addition to upregulating suppressive genes, anergic signaling may downregulate certain activators of T cells to induce/maintain peripheral tolerance.

By comparing the gene expression profiles of tolerance T cells with naïve and activated T cells, Fang discovered that the expression of Synoviolin, a gene whose function in immune cells is unknown, is largely diminished in the tolerized T lymphocytes. He then generated T cell-specific Synoviolin knockout mice. Using this unique mouse model, his team demonstrated that genetic deletion of the Synoviolin gene promotes T cell tolerance induction, inhibits T cell activation, and protects mice from autoimmune disease, implying Synoviolin as a potential therapeutic target for autoimmune diseases.

In addition to its important functions in T lymphocytes, we recently demonstrated that Synoviolin is required for the transcription of the major histocompatibility complex class II (MHC-II) on antigen presenting cells (Journal of Experimental Medicine, 2014). Since MHC-II complex provides the antigen to activate CD4 T cells during autoimmune response, Synoviolin suppression appears to be an ideal and efficient approach in autoimmune therapy by both inhibiting antigen presentation and inducing T cell tolerance.

The current study is to illuminate the molecular mechanisms of Synoviolin in immune tolerance and autoimmune disease development. Fang will use both genetic and pharmacological approaches to evaluate the preclinical efficacy of Synoviolin suppression in autoimmune treatment in mice. The study will provide a better understanding of the molecular puzzle underlying how the immune system knows to tolerate with self-antigens and may open up a novel avenue for autoimmune disease therapy.



PI: Emily Su, MD
Assistant Professor in Obstetrics and Gynecology-Maternal Fetal Medicine

Sponsor: National Heart, Lung, and Blood Institute

Title: "Mediators of impaired fetoplacental angiogenesis in fetal growth restriction"

Fetal growth restriction (FGR) is a major cause of perinatal morbidity and mortality, with nearly one million cases attributable to uteroplacental insufficiency occurring worldwide each year.

Uteroplacental function is governed by three primary components. These include the maternal uteroplacental circulation that perfuses the intervillous spaces; placental trophoblast; and fetoplacental circulation that includes placental vessels contiguous with the fetal vasculature. The majority of research efforts directed at placental insufficiency to-date have been directed toward the maternal uteroplacental circulation and the trophoblast. Yet, the focus on these two components may be misplaced, as it is the fetoplacental circulation that has been demonstrated to be most highly related to adverse outcome. Specifically, abnormally elevated fetoplacental vascular resistance in these pregnancies (FGRadv), as reflected by abnormal umbilical artery Doppler velocimetry, is an ominous finding that substantially increases risk for adverse perinatal outcome, neurodevelopmental consequences, and long-term health problems.

In contrast, growth-restricted pregnancies with preserved fetoplacental blood flow demonstrate perinatal outcomes similar to those with normal growth. This suggests that impaired blood flow within the fetoplacental circulation in FGR fetuses plays a major role in compromising fetal well-being and outcome.

Currently, no preventive or therapeutic measures for FGRadv exist other than delivery. Clinical data demonstrate that al-

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Sponsored Research

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though delivery can avert stillbirth, the number of deaths prior to hospital discharge is unchanged, with neonatal deaths replacing in utero demises. Of the survivors, the incidence of severe disability at school-age was similar regardless of whether delivery occurred immediately after identification of abnormal fetoplacental blood flow (absent or reversed umbilical artery end-diastolic flow) or whether the pregnancy was expectantly managed in an attempt to gain a more mature gestation.

Furthermore, even if a growth-restricted fetus emerges from the perinatal and early childhood unscathed, multiple lines of evidence suggest that they remain at increased risk for developing cardiovascular disease, obesity, and metabolic syndrome in adulthood. Thus, suboptimal placental function with aberrant fetoplacental blood flow during pregnancy not only incurs perinatal risks but has far broader implications for an individual's long-term health.

One major placental abnormality that is consistently seen in FGRadv is a lack of adequate angiogenesis of the fetoplacental vasculature. In normal pregnancies, branching and non-branching angiogenesis persists throughout the latter half of pregnancy (25 through 40 weeks gestation), which allows for an appropriate decrement in placental vascular resistance that continues as gestation progresses. In FGRadv pregnancies, however, the vessels are thin, elongated, and poorly branched, resulting in abnormally high vascular impedance, which often clinically signifies impending stillbirth in the absence of delivery, regardless of gestational age and associated risks of prematurity. Thus, the overall objective of this grant is to determine the cellular and molecular mechanisms by which improper fetoplacental angiogenesis occurs in FGRadv and will specifically focus on the critical aspects of fetoplacental vascular development that occur throughout the latter half of pregnancy. This knowledge is critical if perinatal outcomes after FGRadv are to be improved.

Did You Know?



Northwestern University Feinberg School of Medicine is involved with the only Ebola testing laboratory in Mali. The converted lab was previously an NIH-funded tuberculosis testing facility. [Learn more](#) about how Northwestern scientists are contributing to fight the Ebola epidemic, and how clinicians are preparing for the deadly virus in Chicago.

Funding

Biomarkers of Alzheimer's Disease in Down Syndrome (R01)

[More information](#)

Sponsor: Department of Health and Human Sciences, National Institutes of Health

Submission deadline: December 12 LOI/ January 12 application
Upper Amount: \$2.5 million

Synopsis: The goal of this funding opportunity is to enable the identification of the longitudinal progression of Alzheimer's disease in adults with Down syndrome using clinical, cognitive, imaging, genetic, and biochemical biomarkers. To this end, opportunity encourages multi-disciplinary integrative studies aimed at characterizing the longitudinal trajectory of Alzheimer's-related biomarkers (individually and in combination) in adults with Down syndrome across the disease spectrum (pre-symptomatic to symptomatic) including but not limited to: imaging, CSF and blood biochemical, genetic/genomic, neurocognitive, and/or behavioral/functional.

Interpreting Variation in Human Non-Coding Genomic Regions Using Computational Approaches and Experimental Assessment (R01)

[More information](#)

Sponsor: Department of Health and Human Sciences (HHS), National Institutes of Health (NIH)

Submission deadline: December 21 LOI/ January 21 application
Upper Amount: \$1.5 million

Synopsis: This opportunity solicits applications to develop innovative computational approaches for interpreting sequence variants in the non-protein-coding regions of the human genome. The goal is to develop methods that analyze whole-genome sequence data by integrating data sets, such as ones on genome function, phenotypes, patterns of variation, and other features, to identify or substantially narrow the set of variants that are candidates for affecting organismal function leading to disease risk or other traits. The accuracy of the computational approaches developed should be assessed using experimental data. The scale of analysis should be genome-wide interpretation of the variants that may contribute to the trait or disease being studied, rather than variants found in a particular gene, gene family, or chromosome region.

[View more funding opportunities](#)

High Impact Factor Research

August 2014

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Help Feinberg Track Journals

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

Calendar

Tuesday, October 14

CGM Richard A. Scott, MD Lecture

"Epigenetic Defense Mechanisms: Coping with Transposable Elements in the Drosophila Genome," by Sarah C.R. Elgin, PhD, Washington University in St. Louis, and Investigator, Howard Hughes Medical Institute.

Time: 4 to 5 p.m.

Location: Lurie Medical Research Building — Hughes
303 E. Superior St. (Chicago campus)

Contact: michelle.mohney@northwestern.edu
[More information](#)

Tuesday, October 21

Lurie Cancer Center Nathaniel Berlin Lecture

"Status of CART T Cells for Therapy of Cancer," by Carl H. June, MD, Abramson Cancer Center, University of Pennsylvania.

Time: 4 to 5 p.m.

Location: Lurie Medical Research Building — Hughes
303 E. Superior St. (Chicago campus)

Contact: megan.cahill@northwestern.edu
[More information](#)

Thursday, October 23

Pathology Department Calandra Seminar

"Wnt signaling and adhesion proteins in vascular development," by Elisabetta Dejana, PhD, Italian Institute of Molecular Oncology.

Time: 4 to 5 p.m.

Location: Lurie Medical Research Building — Hughes
303 E. Superior St. (Chicago campus)

Contact: kgreen@northwestern.edu
[More information](#)

Wednesday, November 5

Silverstein Lecture Series

"The Microbiome: A New Frontier In Human Health," by Susan Lynch, PhD, University of California-San Francisco.

Time: Noon to 1 p.m.

Location: Lurie Medical Research Building — Hughes
303 E. Superior St. (Chicago campus)

Contact: michelle.mohney@northwestern.edu
[More information](#)

[More Events](#)

Event organizers are encouraged to submit calendar items on [Plan-It Purple](#) for consideration. Please contact the [Research Office](#) with further questions.

NIH News

NIH Seeks Feedback on Sex Difference in Medical Research

NIH is asking for feedback from the research community on developing and implementing policies that require grant applicants to consider sex as a variable in biomedical research involving animals and cells.

The Institutes posted a formal [Request for Information](#) in September. As described in the RFI, NIH wants investigators to weigh in on several topics, for example: whether consideration of sex as a biological variable is an issue affecting the reproducibility of research findings; what areas of science or phases of research present the greatest needs or opportunities for understanding data disaggregated by sex; and the major challenges to considering sex as a biological variable in research. NIH also wants ideas about how the Institutes can facilitate this aspect of research, and any other feedback related to NIH's development of policies for considering sex as a biological variable in research involving animals, tissues, or cells.

NIH Issues Finalized Policy on Genomic Data Sharing

New NIH guidelines require scientists who work on NIH-funded genomics research to post their data online, so other scientists can build on their studies. The biggest change for researchers is not necessarily the requirement to share data, which is already a common practice in the field, but creating a system of informed consent. Researchers will now need to tell study participants that their data may be widely shared.

Starting with funding applications submitted for a January 25, 2015, receipt date, the policy will apply to all NIH-funded, large-scale human and non-human projects that generate genomic data. This includes research conducted with the support of NIH grants and contracts and within the NIH Intramural Research Program. NIH officials finalized the policy after reviewing public comments on a draft released in September 2013.

[Learn more about the new guidelines.](#)

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