

THE INSTITUTES AT NORTHWESTERN MEDICINE







The history of Chicago is about bigness—its grand design, the magnificent lake that it embraces, the commerce it generates, and the ethnic diversity it champions. This is not a city for the meek or the weak.

The poet Carl Sandburg in “Chicago” coined the moniker, the “City of the Big Shoulders” where work and work ethic are valued; he went on to write “... show me another city with lifted head singing so proud to be alive and coarse and strong and cunning.” This is the city in which we work and live and these sentiments define our core civic values.

As a bellwether city in virtually every aspect of business, commerce, and culture, the time has come for Chicago to assume the alpha position in healthcare.



**WE INTEND TO CREATE A NATIONAL
EPICENTER FOR HEALTHCARE,
EDUCATION, RESEARCH, COMMUNITY
SERVICE, AND ADVOCACY.**



NORTHWESTERN MEDICINE

Northwestern Memorial Hospital and Northwestern University Feinberg School of Medicine are seeking to impact the health of humankind through Northwestern Medicine. We aspire to be the destinations of choice for people seeking quality healthcare; for those who provide, support, and advance that care through leading-edge treatments and breakthrough discoveries; and for people who share our passion for educating future physicians and scientists. Our commitment to transform healthcare and to be among the nation's top academic medical centers will be accomplished through innovation and excellence.

There is nothing that touches a patient today that did not have its origin somewhere as an experiment. Philanthropic investments in biomedical research, education, and care have transformed American society and human health. People now live longer with a better quality of life, and illnesses considered death sentences less than a generation ago are now treated successfully as chronic diseases. Investment in academic medical centers, like Northwestern Medicine, also transforms more than our health. Philanthropy is a key component that drives economic development through

In downtown Chicago, Northwestern Memorial Hospital is one of the country's premier academic medical center hospitals and the primary teaching affiliate for Northwestern University Feinberg School of Medicine. Virtually every medical specialty is represented by the medical staff of more than 1,700 affiliated physicians who also carry faculty appointments with Feinberg. Nationally recognized for quality and patient

safety, Northwestern Memorial is affiliated with Northwestern Lake Forest Hospital, a community hospital serving the northern suburbs in Cook and Lake counties offering a continuum of healthcare services and a medical staff of 700 physicians trained in more than 90 specialties. Both are recognized with Magnet status, the gold standard for nursing excellence and nonprofit institutions with a strong commitment to the

community. Northwestern Memorial is the only Illinois hospital named to *U.S. News & World Report's* prestigious honor roll of the nation's best hospitals for 2012–13. Both hospitals are consistently ranked as the "most preferred" by healthcare consumers in their service areas.



WITH THE CONTINUED INVESTMENT OF OUR PHILANTHROPIC PARTNERS, WE WILL IMPACT THE HEALTH OF HUMANKIND.

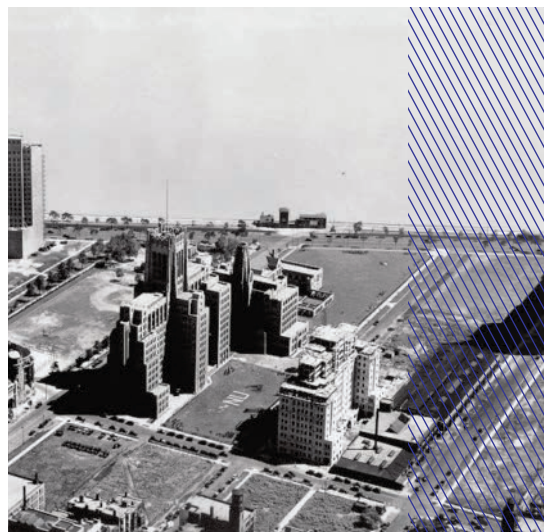
the creation of new industries and technologies, provides an educated workforce with skilled jobs, and expands the employee tax base for public benefit. Advances in biomedical research and education ensure a broad and sustainable healthcare workforce.

As Northwestern Medicine, we must continue to drive high-impact scientific and clinical innovation to remain in the forefront of medicine. The platforms for our plans are two new structures: a contemporary 25-story Outpatient Care Pavilion that will encompass one million square feet, making it as large as our main hospital

pavilion; and a 12-story Medical Research Pavilion connected to the Robert H. Lurie Medical Research Center that will enable us to double our current research enterprise. With the arrival of the Ann & Robert H. Lurie Children's Hospital of Chicago to the Streeterville campus, this new Research Pavilion also will ensure the marriage of the Northwestern and Lurie Children's research enterprises to maximize collaboration.

From these infrastructure platforms, our vision to remain thought leaders in impacting health locally, nationally, and globally will be driven by 10 Institutes

at Northwestern Medicine. These omnidisciplinary units are aimed at planning, coordinating, and implementing patient care, research, education, community service, and advocacy across broad areas of biomedicine. They cross boundaries of Northwestern schools, departments, and hospitals and are designed to improve communication and harmonize the missions of Northwestern Medicine. Within this brochure, we highlight our plans and vision. With the continued investment of our philanthropic partners, we will impact the health of humankind.



Northwestern University Feinberg School of Medicine has a faculty of 3,129 professionals dedicated to research and teaching. Recently, Feinberg research awards totaled \$284 million and researchers filed 59 invention disclosures. More than 2,500 medical and graduate students, physician assistants, residents, and fellows receive their education and training at Feinberg each year, and the school consistently ranks among the nation's best.

A close-up photograph of two surgeons in an operating room. They are wearing blue surgical masks and blue-rimmed glasses with attached surgical lights. The background is a bright blue, out-of-focus light source. The text 'THE HEART INSTITUTES AT NORTHWESTERN MEDICINE' is overlaid in white, bold, sans-serif font across the top half of the image.

THE HEART INSTITUTES AT NORTHWESTERN MEDICINE

At Northwestern, we aspire to be the “go-to” center for heart and vascular disease care; to be the innovators of novel therapies and the purveyors of clinical excellence; and to serve as the trusted source of information for the lay and professional communities on all matters pertaining to heart and vascular disease.

Northwestern Medicine is home to the Northwestern Bluhm Cardiovascular Institute, offering comprehensive services and treatments in all areas of cardiovascular care, and the Feinberg Cardiovascular Research Institute, which has a mission to improve quality of life through creative basic and translational research in cardiovascular disease and to build a legacy of outstanding scholarship, scientific achievement, and therapeutic discovery. Together, Northwestern Medicine intends to create a national epicenter for heart and vascular disease prevention, discovery, and care.

This big plan is possible because of the exceptional breadth and depth of our talented people at Northwestern. Northwestern physicians and scientists are nationally recognized leaders in the field of cardiovascular health. They are addressing the prevention and treatment of heart and vascular disease through the investigation of new technologies, drugs, techniques, and devices that ultimately translate into the best patient care.

We have clinical excellence and specialists in coronary disease, heart failure, heart rhythm disorders, heart valve disease, vascular disease, and women’s cardiovascular health. Our patient-focused, multidisciplinary team of specialists addresses each patient’s individual emotional, social, and physical health needs. We have established a cardiac behavioral medicine program to help cardiovascular patients adjust to a diagnosis and become more resilient throughout the course of treatment. Techniques include strategies that facilitate behavior change, improve coping strategies, minimize stress, and address ways of thinking, like those associated with anxiety and depression.

Northwestern also leads in-depth basic science and clinical studies to address today’s important questions about heart disease and to contribute new knowledge about next generation therapies. One area of investment has been in the field of regenerative medicine, a rapidly developing and exciting field of medicine



that seeks to regenerate (repair and/or replace) damaged tissue in the body. While conventional medicine attempts to improve the function of damaged tissue with medication or surgery, Northwestern seeks to regenerate cardiac and vascular tissue in a number of ways, including the use of gene therapy and autologous (one's own) stem cell therapy. Our work also involves studies of angina and peripheral artery disease.

Further investment has centered on the prevention of heart disease. Northwestern investigators have provided the core for the national definition of cardiovascular

health over the past decade. Two large studies from Northwestern Medicine confirm that a healthy lifestyle has the biggest impact on cardiovascular health. One study shows the majority of people who adopted healthy lifestyle behaviors in young adulthood maintained a low cardiovascular risk profile in middle age. The five most important healthy behaviors are not smoking, low or no alcohol intake, weight control, physical activity, and a healthy diet. The other study shows cardiovascular health is due primarily to lifestyle factors and healthy behavior, not heredity.

Susan Quaggin, MD, (right) an international authority in the field of nephrology, has joined Northwestern as the Charles Horace Mayo Professor of Medicine, and serves as director of the Feinberg Cardiovascular Research Institute and chief of the Division of Nephrology. "As one of the world's most dynamic and creative investigators in the fields of nephrology and vascular biology, Dr. Quaggin is an

outstanding addition to the Feinberg faculty," said Eric G. Neilson, MD, vice president for medical affairs and Lewis Landsberg Dean. "Her career has been built around the pursuit of novel genetic methods to understand the complexity of capillary formation in health and disease, and her leadership will undoubtedly shine an international spotlight on the division and our cardiovascular research institute."

WE INTEND TO PROVIDE EXTRAORDINARY CARE TO THE CITIZENS OF CHICAGO. WE ASPIRE FOR GREATNESS AND SEE OUR SCALE AT A NATIONAL LEVEL.



“Eight years ago when the Bluhm Cardiovascular Institute was created, we set out to build a nationally recognized program that delivered safe and highly specialized cardiovascular care,” said **Patrick M. McCarthy, MD**, Northwestern Memorial Hospital’s chief of cardiac surgery, director of the Northwestern Bluhm Cardiovascular Institute, and the Heller-Sacks Professor

of Surgery at Northwestern University Feinberg School of Medicine. “Now, eight years later, through pioneering new procedures like transcatheter aortic valve replacement and offering sophisticated and complex treatment options like heart transplantation and minimally invasive procedures to cure atrial fibrillation, we remain ever vigilant of this goal for both our patients and the community we serve.”



We intend to provide extraordinary care to the citizens of Chicago. More than that, we intend to make Chicago the destination of choice for those who are at risk for, or already impacted by, heart and blood vessel disease. We aspire for greatness and see our scale at a national level. Generous and committed donors already have made so much possible through

their support. The ingredients are simple: a galvanizing plan that brings us under one tent; community leadership that helps us build this asset in Chicago; capital to recruit the team and support research; and marketing to catalyze our team of physician leaders to reach beyond the ordinary and attain the exceptional.

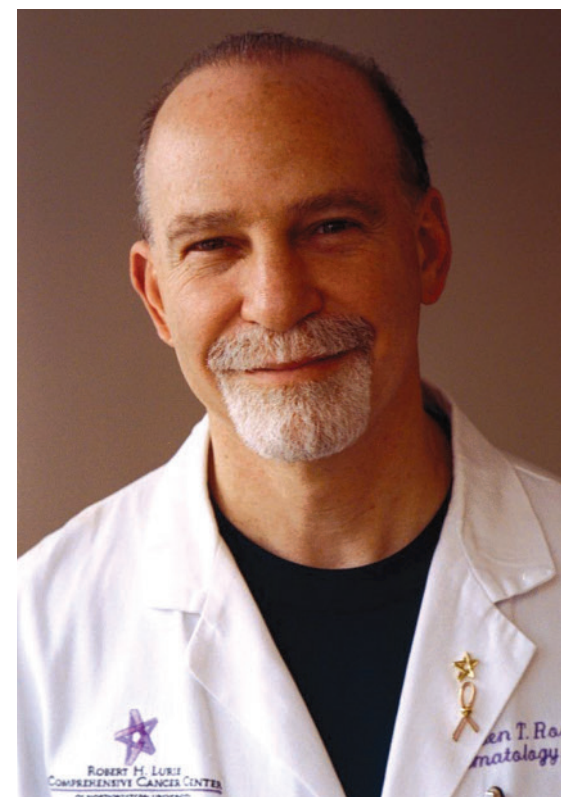
THE CANCER INSTITUTES AT NORTHWESTERN MEDICINE



Recognized as a national leader in cancer treatment, the Robert H. Lurie Comprehensive Cancer Center of Northwestern University supports care for a broad scope of cancers through comprehensive research; distinguished and dedicated faculty and staff; a world-class teaching program; and ongoing advances in medical, surgical, radiation, and interventional oncology. These are complemented by nationally recognized supportive oncology care and survivorship programs that include a Division of Fertility Preservation for young cancer survivors. In addition, the Lurie Cancer Center facilitates cancer prevention, early detection, treatment, rehabilitation, and recovery through patient education and the use of complementary therapies.



**THERE IS A CRITICAL NEED FOR
A BASIC AND TRANSLATIONAL
SCIENCE PROGRAM TO PROMOTE
BREAKTHROUGH DISCOVERIES,
FACILITATE PARTNERSHIP
WITH COLLEAGUES IN THE
PHYSICAL SCIENCES...**



Steven Rosen, MD

The Lurie Cancer Center has established major research strengths in breast, genitourinary, gastrointestinal, aero-digestive, neurologic, and gynecologic cancers; hematologic malignancies, sarcoma, melanoma, and pediatric oncology. Basic and translational research programs in hormone action/signal transduction, angiogenesis, gene regulation, biologic therapies, oncologic mathematical modeling, and nanotechnology are nationally and internationally recognized.

Clinicians and scientists work to develop innovative approaches to the treatment and prevention of cancer through the Lurie Cancer Center and generate more than \$175 million annually in extramural cancer-related research support.

As cancer research at Northwestern continues to evolve and expand, there is a critical need for a basic and translational science program to promote breakthrough discoveries, facilitate partnership with colleagues in the physical sciences, and allow for competition with the great cancer centers in the United States. The development of a Department of Cancer Biology will result in further expansion of the scope of cancer research at Northwestern. The emergence of such a department will allow us to develop new areas of basic cancer research, capitalizing on new, evolving technologies and unique strengths here at Northwestern. This new department also will play an important role in advancing translational work related to

cancer and ultimately affect the development of investigator-initiated clinical trials. Through innovative research and fruitful collaborations, the department will advance our commitment to positively impact the lives of those living with a cancer diagnosis today and in the future.

In addition to the creation of a Department of Cancer Biology, several new institutes and centers that facilitate the work of cancer physicians and scientists have been or will be established within the next few years. These robust interfaces and collaborations lead to clinical advances that benefit patients and their families.

See next page for list of institutes.



The Robert H. Lurie Comprehensive Cancer Center of Northwestern University is one of only 40 "comprehensive cancer centers" in the nation, as designated by the National Cancer Institute. It is a founding member of the National Comprehensive Cancer Network (NCCN): an alliance of 21 of the nation's leading cancer centers dedicated to improving the quality and effectiveness of cancer care through development of clinical treatment guidelines and longitudinal outcomes research.

Northwestern Brain Tumor Institute

Launched in 2008, the institute is accelerating efforts to provide leading-edge therapies and minimally-invasive surgical approaches to brain and spinal tumors and is investing in groundbreaking research fortified by the presence of the Stem Cell Research Lab and the Center of Cancer Nanotechnology Excellence.

Early Cancer Detection Technologies Institute

The Early Cancer Detection Technologies Institute will promote cross-cutting, interdisciplinary approaches to develop technology to detect cancer metastasis at its earliest stages, allowing for life-preserving interventions.

Developmental Therapeutics Institute

The creation of an institute devoted to cancer therapeutics positions Northwestern as a world leader in the delivery of new diagnostic and therapeutic approaches for patients with cancer and further cements Chicago's position as a destination for high-quality biomedical research and patient care.

Cellular Immunotherapy Institute

The institute will develop novel translational approaches that will enable cell-mediated immune therapies in cancer and potentially other areas of medicine, emphasizing a clinically-oriented approach to solving the complex health problems related to cancer.

Women's Cancers Institute

The Lurie Cancer Center's nationally recognized program is dedicated to advancing research and the treatment and prevention of breast and gynecologic malignancies that affect women. Patients receive their care through the nation's preeminent breast cancer treatment facilities: the Lynn Sage Comprehensive Breast Center and The Maggie Daley Center for Women's Cancer Care. The institute treats the "whole" patient to respond to the specialized needs of women; offers a cancer genetics program to screen patients at higher-than-average risk for cancer, provides women with access to clinical trial opportunities; trains current and future medical professionals; and educates patients and the public.

Oncology Nursing Institute

Through standardized education and centralized competencies for nurses across the continuum of care, this institute will support professional and leadership development, quality initiatives, and performance improvement; and will foster a practice environment conducive to clinical inquiry, evidence-based practice, and translation of nursing research.

Skin Cancer Institute

The institute is a multidisciplinary, comprehensive, and patient-centered clinical program that was established in 2011 to continue and expand innovative clinical and basic science research that seeks to better understand all aspects of skin cancers and to discover new approaches for skin cancer prevention, diagnosis, and management.

Thoracic Oncology Institute

Emphasizing an interdisciplinary approach to the treatment of lung and other thoracic cancers, the institute's team of surgeons and physicians partner with laboratory scientists on research and clinical trials that will define the future of lung cancer prevention, early detection, and treatment while maximizing quality of life and ensuring coordinated care and a customized, yet aggressive, approach to the treatment of thoracic malignancy.

Hematologic Malignancies Institute

Hematologic malignancies are the types of cancer that affect blood, bone marrow, and lymph nodes. As the three are intimately connected through the immune system, a disease affecting one of the three will often affect the others as well. At the Lurie Cancer Center, this accomplished program centers on compassionate, individualized patient care and scientific breakthroughs specific to the broad spectrum of blood cancers, including acute and chronic leukemia, Hodgkin's and non-Hodgkin's lymphoma, and multiple myeloma. Several of the program's members have received national recognition for their work including the discovery of important therapeutic targets and the development of novel agents and approaches for the treatment of these malignancies. Our clinical program is the largest in Illinois and includes both adult and pediatric patients with expertise in each disease subset, as well as the leading stem cell transplant program.

Gastrointestinal (GI) Oncology Institute

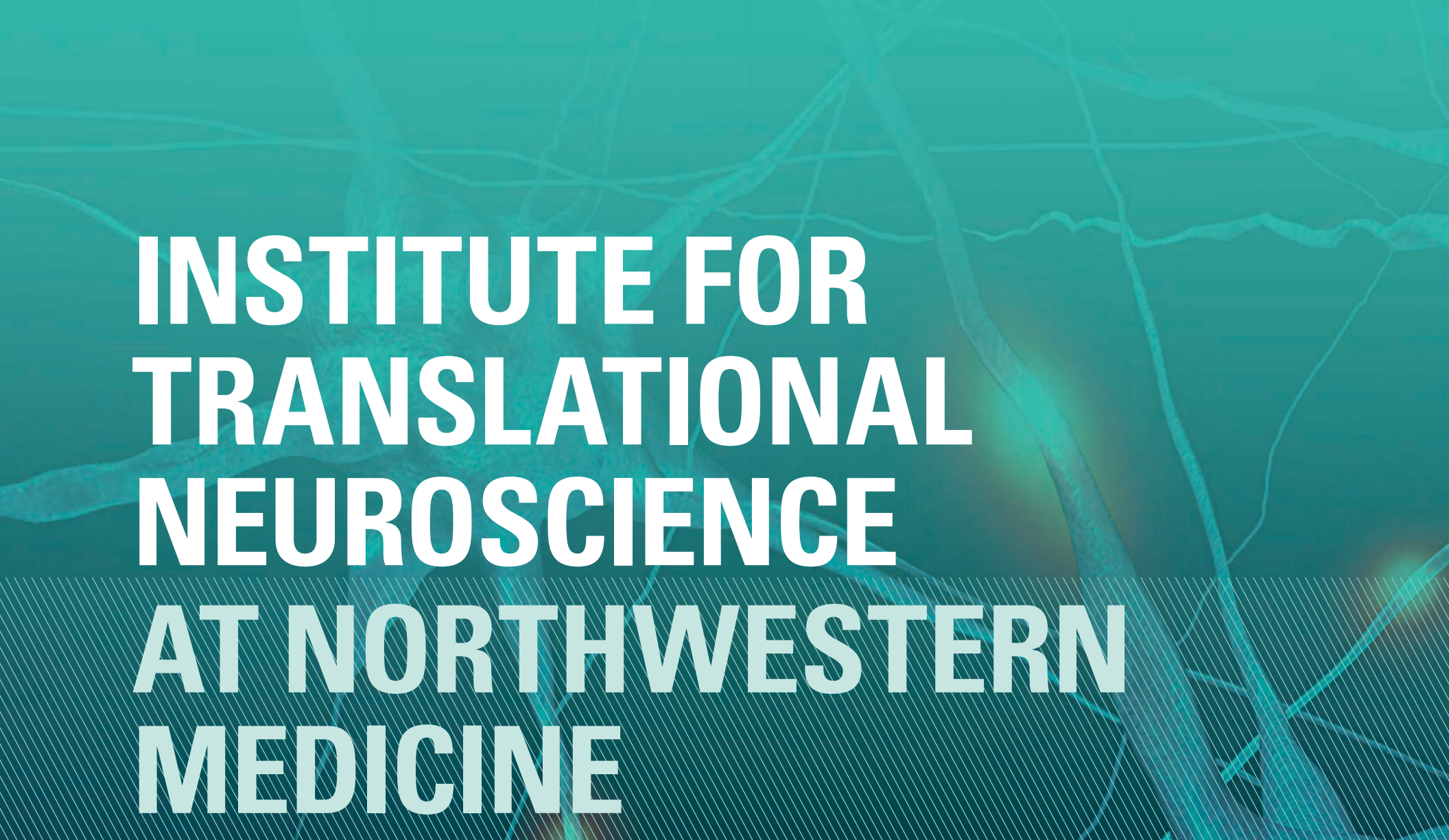
The GI program builds on the foundation of a nationally renowned, state-of-the-art patient care and clinical research program in GI oncology and interventional and diagnostic radiology that has, in recent years, been complemented by an innovative basic science program in GI cancer biology and genetics and a robust cancer imaging research program. Northwestern-affiliated clinicians and hospitals have long been nationally known for their expertise in the diagnosis and treatment of patients encompassing the entire spectrum of GI oncology, including cancers of the esophagus, stomach, pancreas, hepatobiliary system, colon/rectum, and anus, and neuroendocrine tumors. Patients receive highly integrated care due to the close collaboration between surgeons, radiologists, interventional radiologists, hepatologists, and medical oncologists.

Sarcoma Institute

The sarcoma program at the Lurie Cancer Center is nationally recognized for its expertise in the area of bone and soft tissue sarcomas. A talented group of clinical investigators, surgeons, physician assistants, and basic scientists is committed to furthering clinical and basic research and studying the role and use of molecular targeting agents for these tumors, and improving radiotherapy outcomes.

Prostate and Genitourinary Malignancies Institute

Genitourinary malignancies encompass cancers of the prostate, bladder, kidney, and testis. Patients are evaluated and managed with emphasis on an integrated, multidisciplinary, and stage-specific approach. Lurie Cancer Center members are recognized leaders in their field of expertise, and all potential therapeutic options, including observation (no active treatment), surgical excision, radiation therapy, chemotherapy, and immunotherapy, are considered and discussed with each patient.



**INSTITUTE FOR
TRANSLATIONAL
NEUROSCIENCE
AT NORTHWESTERN
MEDICINE**



Neuroscience has exploded to include molecular, cellular, developmental, structural, functional, evolutionary, computational, and medical aspects of the nervous system. The ultimate goal of translating basic science insights into new preventives, diagnostics, and therapeutics in the neurosciences has been somewhat elusive when compared to areas such as cancer and cardiovascular medicine.

Neurosciences has the largest group of investigators and clinical faculty at Northwestern. Unlike most institutions with strength in neuroscience, we also have an extraordinary faculty in chemistry, materials science, bioengineering, molecular imaging, and nanotechnology—disciplines that are critical to success in developing the next generation of therapeutics. This group has a proud history of accomplishment in translational neuroscience, particularly in the area of drug development to ensure new treatment options for patients. We will maximize the resources of our National Institutes of Health (NIH) Centers of Excellence: Alzheimer's, Stem Cell Center, Morris K. Udall Center of Excellence in Parkinson's Disease Research, Sleep and Circadian Rhythms, Biophysical Research Partnership focused on spinal cord injury, and Silvio O. Conte Center for the Neuroscience of Mental Disorders,

as well as 35 core facilities across all departments and centers.

Our Institute for Translational Neuroscience will empower creative scientists and clinicians to translate a deep and rigorous understanding of disease mechanisms into new preventives, diagnostics, and therapeutics for use in diseases of the nervous system. Our efforts can be seen in laboratories and clinics, in the composition of search committees, and in the comprehensive care provided to patients by health practitioners with diverse expertise and perspectives. In addition to Northwestern Memorial Hospital, our clinical partners—the Rehabilitation Institute of Chicago and Ann & Robert H. Lurie Children's Hospital of Chicago—are located on the Northwestern medical campus and provide world-class care to patients and access to the latest clinical trials.

In an early-stage breakthrough, a team of Northwestern University scientists has developed a new family of compounds that could slow the progression of Parkinson's disease. Parkinson's, the second most common neurodegenerative disease, is caused by the death of dopamine neurons, resulting in tremors, rigidity, and difficulty moving. Current

treatments target the symptoms but do not slow the progression of the disease. The new compounds were developed by Richard B. Silverman, PhD, the John Evans Professor of Chemistry at the Weinberg College of Arts and Sciences and inventor of the molecule that became the well-known drug Lyrica, and **D. James Surmeier, PhD**, Nathan

Smith Davis Professor of Physiology and chair of the Department of Physiology at Northwestern University Feinberg School of Medicine. "We should be able to slow the progression of the disease or significantly reduce the risk that anyone would get Parkinson's disease if they take this drug early enough," says Dr. Surmeier.



John Csernansky, MD

Our work will focus on the following scientific domains:

Neuroprotection:

One of our major achievements at Northwestern University is the elucidation of mechanisms underlying neurodegenerative disease. This understanding is being translated into novel neuroprotective strategies in a range of prominent diseases, including Alzheimer's disease, Parkinson's disease, Huntington's disease, and amyotrophic lateral sclerosis (ALS).

Neurorepair:

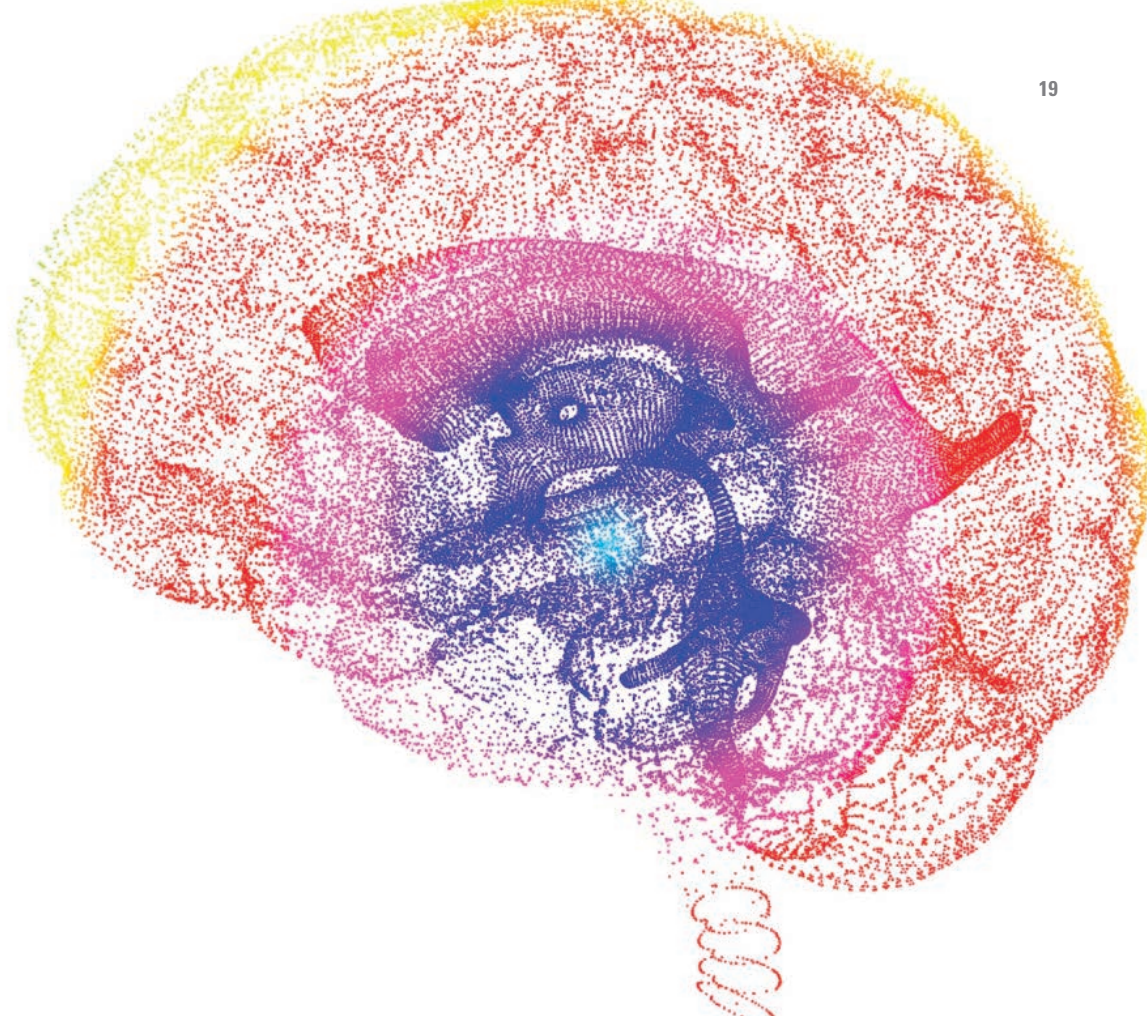
Recent advances in stem cell research have the potential to transform the treatment of neurological diseases. Northwestern is extraordinarily well positioned to take advantage of this advance because capitalizing will not only require expertise in the biological sciences, but also in the physical sciences. For example, nanotechnology is being used to create new scaffolds in the brain to support the introduction of new neurons into an adult brain.

Neuroprosthetics:

Northwestern Medicine, with the Rehabilitation Institute of Chicago, has been repeatedly recognized for excellence in the development of neuroprosthetics and creation of brain-machine interfaces. Our achievements in this area are an example of the cooperation of basic science, engineering, and clinical faculty in the pursuit of an unmet clinical need.

Sleep and circadian disorders:

It is known that cells have circadian clocks and that this timing mechanism is disrupted in patients with a variety of brain disorders. It is also understood that so-called "Clock" genes involved in gene expression and signal transduction are associated with neurologic function and pathophysiology. Our team of internationally renowned investigators will incorporate biologic timing as a new strategic approach for diagnosing and treating brain disorders.



Inflammation/Immunology:

Immune responses are central to diseases like multiple sclerosis and contributory to the response to stroke and other brain injury. Experts in inflammation and the immune response will target signal transduction pathways, as well as cell surface molecules and receptors involved in these processes.

Neural network modulation:

Many disorders of thinking, emotion, and behavior emerge as the result of disturbances in the flow of information across neural networks. Because of rapid advances in the development of *in vivo* imaging tools to study and manipulate these networks, we are on the threshold of understanding the fundamental basis of these disorders. New behavioral techniques based on manipulating the fundamental elements of learning and memory can be used alone and in combination with specific drug therapies and neuromodulation therapies to reverse these disorders.

Rehabilitation robotics and neuroimaging:

Difficulty moving following a stroke or in children with cerebral palsy is often related to the loss of essential neural pathways. Using robots, while looking at the active brain, allows us to study why certain movement impairments occur. These same robots also can be used as precise tools to develop new treatment approaches that take advantage of remaining brain structures and can be used to regain movement function. The subsequent development of rehabilitation robots for use in the clinic as well as at home is an example of the translational nature of our neuroscience institute.

Vision/visual neuroscience:

The study of vision and visual neuroscience provides a unique opportunity to understand the function of the nervous system. Fundamental principles of how the brain works can be learned from our neurophysiologic work on how the retina develops and transmits images through

complex cell communications. The eye and its age-related diseases of glaucoma and macular degeneration provide an ideal model to image and study degenerative diseases of the nervous system. In collaboration with Northwestern experts in biomedical engineering, our vision researchers are developing disease detection techniques that will lead to early identification of both eye diseases, as well as other neurodegenerative conditions and the possibility of earlier treatment.

A vibrant assortment of fresh vegetables including broccoli, carrots, radishes, asparagus, artichokes, and potatoes. The vegetables are arranged in a way that fills the frame, with a semi-transparent green banner overlaid across the middle containing white text.

**DIABETES, OBESITY
AND METABOLISM
INSTITUTE
AT NORTHWESTERN
MEDICINE**

Diabetes and obesity are at crisis levels and cause great morbidity and mortality in our society. Our Diabetes, Obesity and Metabolism Institute at Northwestern Medicine will focus on patient care, education, research, and outreach related to these entities and the underlying metabolic pathways involved in disease. We hope to establish an international model for improving the outcomes, overall health, and quality of life of countless individuals affected by diabetes and its related conditions. The new therapies that will emerge from our researchers have the potential to help millions of Americans living with diabetes.

Diabetes is a chronic condition characterized by high levels of sugar in the blood. Over time, this surplus of blood sugar can manifest in a person with diabetes through a number of serious, sometimes life-threatening, complications such as heart disease, stroke, high blood pressure, blindness, kidney disease, diseases of the nervous system, amputations, dental disease, complications of pregnancy, and more. Good diabetes control can help reduce the risk for complications, but

many people are not even aware that they have diabetes until they have already developed one of its complications.

We plan to elevate the stature of our Diabetes and related programs to national prominence. Northwestern Medicine will not only build upon current strengths, but also will increase the scope and offerings of services available to patients with diabetes. In striving to accomplish these goals, we seek to enhance the overall

The cost of obesity in the workplace is estimated to be over \$73 billion annually attributed to absenteeism and decreased productivity in the United States. Since it is well recognized that individuals differ in metabolic efficiency, predisposing many, especially minorities, to the development of obesity, research identifying new therapeutic targets that safely increase energy expenditure may be expected to yield effective treatments for the obese.



Lewis Landsberg, MD

patient experience by providing a “one-stop shop,” where all of our patients’ needs can be accommodated at one location, thus promoting better self and team control of their healthcare long before complications arise. Northwestern has made significant progress in the specialty arenas related to diabetes, including endocrine, obesity, and metabolism disorders, along with the subspecialty areas within this field such as kidney vascular disease, foot and ankle disorders, venous and arterial ulcers, and retinopathy.

Developed in 2006, Northwestern also leads the Diabetes Collaborative, which serves to meet the critical need for diabetes education and treatment in medically underserved communities. This initiative has focused on finding meaningful ways to reach patients with varying levels of education and literacy and unique cultural beliefs. Educational

tools have been developed in Spanish to support self-management of the disease.

Our drive to ensure the best patient care will be advanced through our vital research program from genetic and personalized medicine protocols, to studies involving immunologic therapies for the prevention of Type 1 Diabetes, to the most sophisticated insulin delivery protocols. At Northwestern, we discovered that a single mutation in a Clock gene can lead to obesity and signs of metabolic syndrome. This has led to a revolution in our understanding of how the Clock is linked to many cellular pathways involved in metabolism. Through the institute, we will expand our approaches by integrating the importance of Clock genes into Northwestern communities that are studying and treating metabolic dysregulation in obesity and diabetes. We also will pursue studies of genomics and its relation to diabetes and its



WE SEEK TO ENHANCE THE OVERALL PATIENT EXPERIENCE BY PROVIDING A “ONE-STOP SHOP.”



complications. It is expected that clinical research will be at the cutting-edge of therapeutic discoveries in Type 1 and Type 2 Diabetes, and obesity.

Additionally, cross-research activities will be encouraged in areas focusing on the thyroid, bones, and pituitary gland. We also will establish core resources in the above programs to efficiently facilitate discovery and scientific breakthroughs in these specific areas of interest.

One of the strongest proven connections to diabetes is obesity, which also represents a complex problem of epidemic proportions. The Northwestern Comprehensive Center on Obesity is tackling the complexities of obesity with an expanding program that encompasses fundamental cellular research, studies of systems biology, clinical research, and clinical care—including lifestyle management and medical and surgical

treatment. The center also pursues epidemiological and outcomes research, public education, and public policy. Northwestern’s research arsenal will include the conduct of further research involving obesity’s natural connection to diabetes.

Intimately related to the epidemics in diabetes and obesity are abnormalities of metabolic pathways giving rise to heart disease, stroke, high blood pressure, and other life-threatening entities. We have developed a center for understanding the relationship between nutrition and heart disease to identify, prevent, and treat patients at risk for diabetes, stroke, and coronary artery disease. We are focusing on health education and disease management to disseminate knowledge, understanding, and treatment.

MOTHERS AND CHILDREN'S INSTITUTE AT NORTHWESTERN MEDICINE



Northwestern Medicine has a long history of excellence and innovation in the arena of Mothers and Children's Health. We are recognized as a leader in obstetrics, gynecology, and women's health at the local, national, and international levels. We maintain excellence in education; conduct innovative, evidence-based basic, translational, and clinical research; provide the highest quality patient care and patient satisfaction while serving as the largest maternity hospital in the Midwest; are recognized as one of the top places for high-risk obstetrical service in the nation; and serve as a resource to the community.

We will continue to provide national impact given the clinical strengths of Prentice Women's Hospital and the now-adjacent Ann & Robert H. Lurie Children's Hospital of Chicago, balanced with exceptionally strong research initiatives that have already captured the support of the National Institutes of Health (NIH).

To continue to drive nationally recognized care directed at the needs of mothers and children, we are focusing on providing new knowledge and new approaches.

Philanthropy will play an ever-increasing role in efforts that are designed to have specific outcomes, ensure long-term impact, and can be replicated nationally. Northwestern has researchers who are paradigm-shifters and trend-setters in their fields: they have defined the standard of care in clinical obstetrics, coined terms like oncofertility and progesterone resistance, and have discovered fundamental mechanisms of poorly understood gynecologic disorders such as endometriosis and uterine fibroids.

The new 23-story, state-of-the-art **Ann & Robert H. Lurie Children's Hospital of Chicago** provides superior care to the region's most critically ill and injured children. This new facility on Northwestern's Chicago campus will help in the recruitment of top pediatric specialists to Chicago; encourage researchers in child and adult health

to work closer together; allow for faster transport for critically ill newborns from Prentice Women's Hospital—the largest birthing center in Illinois; and improve transition of our patients with chronic conditions into adult care at Northwestern Memorial Hospital and the Rehabilitation Institute of Chicago.

We also benefit greatly from collaborations with physicians and researchers at the Ann & Robert H. Lurie Children's Hospital of Chicago. Dedicated to understanding and promoting optimal child health and function, our partnership values excellence and innovation in clinical and basic research, coordinated and comprehensive patient care, ongoing physician education, and soundly-based child advocacy. Together, we will provide leadership in endeavors that promote the health of children locally, nationally, and internationally.

For example, in the 21st century, over 400,000 children per year are born prematurely and are at risk for the consequences of premature birth, such as cerebral palsy, blindness, and even diseases not typically diagnosed until adulthood, such as cardiovascular disease. We are positioned to substantively improve the health of mothers and their infants related to the pathologies of pregnancy responsible for the majority

of adverse obstetrical outcomes, including preterm labor, preeclampsia, and intrauterine growth restriction.

Over the past 11 years, Northwestern has maintained one of the 14 existing centers of the National Institute of Child Health and Human Development's Maternal-Fetal Medicine Units Network, and the success of our center has been recognized by the NIH. We plan to stay in the forefront of fetal medicine discoveries by pursuing new knowledge in fundamental mechanisms, whereby early embryonic development and intrauterine environment predispose offspring to chronic disease later in life. A key emphasis will be to determine whether these mechanisms may contribute to disparities in the prevalence of obesity, diabetes, hypertension, cardiovascular disease, neurodegeneration, cancer, and emotional and behavioral disorders among various races and ethnic groups. Our work will encourage and support research on the



WE ARE RECOGNIZED AS A LEADER IN OBSTETRICS, GYNECOLOGY, AND WOMEN'S HEALTH AT THE LOCAL, NATIONAL, AND INTERNATIONAL LEVELS.



basic biological processes that may explain the lifelong consequences of *in vitro* fertilization, intrauterine growth retardation, and/or exposure to deficient and/or stressful intrauterine environments.

Further, there is increasing evidence that the prenatal environment profoundly influences health and disease trajectories

across the lifespan. Maternal diabetes is a well-known risk factor impacting infant and child health. Adverse prenatal exposures—particularly to stress, cigarette smoke, and depression—have been robustly associated with a host of health risk conditions (e.g., obesity, hypertension, and compromised immunologic function); physical diseases (e.g., cardiovascular disease, metabolic

syndromes, cancer, and respiratory illness); and mental health problems (e.g., disruptive behavior, depression, and schizophrenia) across the lifespan. If we understand the roots of disease in early life, we will be able to intervene earlier and more effectively.

Prentice Women's Hospital offers a comprehensive, patient-centered program for women's and infants' health. The hospital has 256 beds dedicated to women's health and 10 operating rooms. Its labor-delivery-recovery (LDR) area features 32 LDR rooms, four C-section operating rooms, 12 rooms for triage, and eight prep/hold/recovery rooms. The Level III René Schine Crown Special Care Nursery accommodates 86 newborns and is staffed at all times by neonatologists. The nursery, which receives transports through the Northwestern Perinatal Network as well as infants born at Northwestern Memorial Hospital, provided care for more than 1,850 premature or seriously ill newborns in fiscal year 2012.

The background features a grid of DNA base pairs (A, T, C, G) in a light blue color. A prominent, semi-transparent DNA double helix structure is visible on the left side of the image. The text is centered and overlaid on the grid.

INSTITUTE FOR GENES AND ENVIRONMENT AT NORTHWESTERN MEDICINE

Biology is the study of living things; it focuses on how man is like flies, worms, and mice in terms of the building blocks of life. In contrast, disease and the practice of medicine are the result of differences between individual people. Why one individual develops an illness while others do not is due to differences in gene sequence, gene expression, and environmental factors. The genes that we express may determine vulnerabilities, susceptibilities, or resistance to disease. The environment in which we live impacts gene expression and function and hence ultimate health and/or disease.

This institute will focus on a better understanding of the diversity of clinical disease (phenotype) and its relationship to inherited and acquired differences in gene sequence and expression, as well as environmental impact on these parameters. Appreciation of individual differences in genes and environment has given rise to the concept of personalized medicine. Large collaborative projects like the Human Genome Project have ushered in a new era of understanding the role of genes and genetic variability in health and disease. Genes give rise to proteins, building blocks of life involved in processes

that result in healthy or diseased cells. Such a molecular understanding has already impacted drug development, diagnostics, and preventive approaches to disease.

In addition, we now know that environmental factors impact gene expression and cellular function. Diseases as diverse as cancer, heart disease, neurologic diseases, diabetes, asthma, and infections result from an interplay between our inherited genes, acquired changes in gene sequence and expression, and environmental factors. Basic scientists in biology, genetics, physiology, and

pathology of disease work with clinicians informed by medical history, family history, symptoms, and data from laboratory tests to develop databases of information to align with gene sequence, expression, and environmental factors.

Northwestern has already invested in this field with two major efforts. The first is NUgene, a DNA biobank linked to access electronic health records. Almost 11,000 volunteers have agreed to provide a DNA sample that can be used for genetic studies and to allow data mining of their electronic health records and related electronic data sources. To date, over 5,000 of these DNA samples have been genotyped to a minimum of 660,000 sites across the genome.

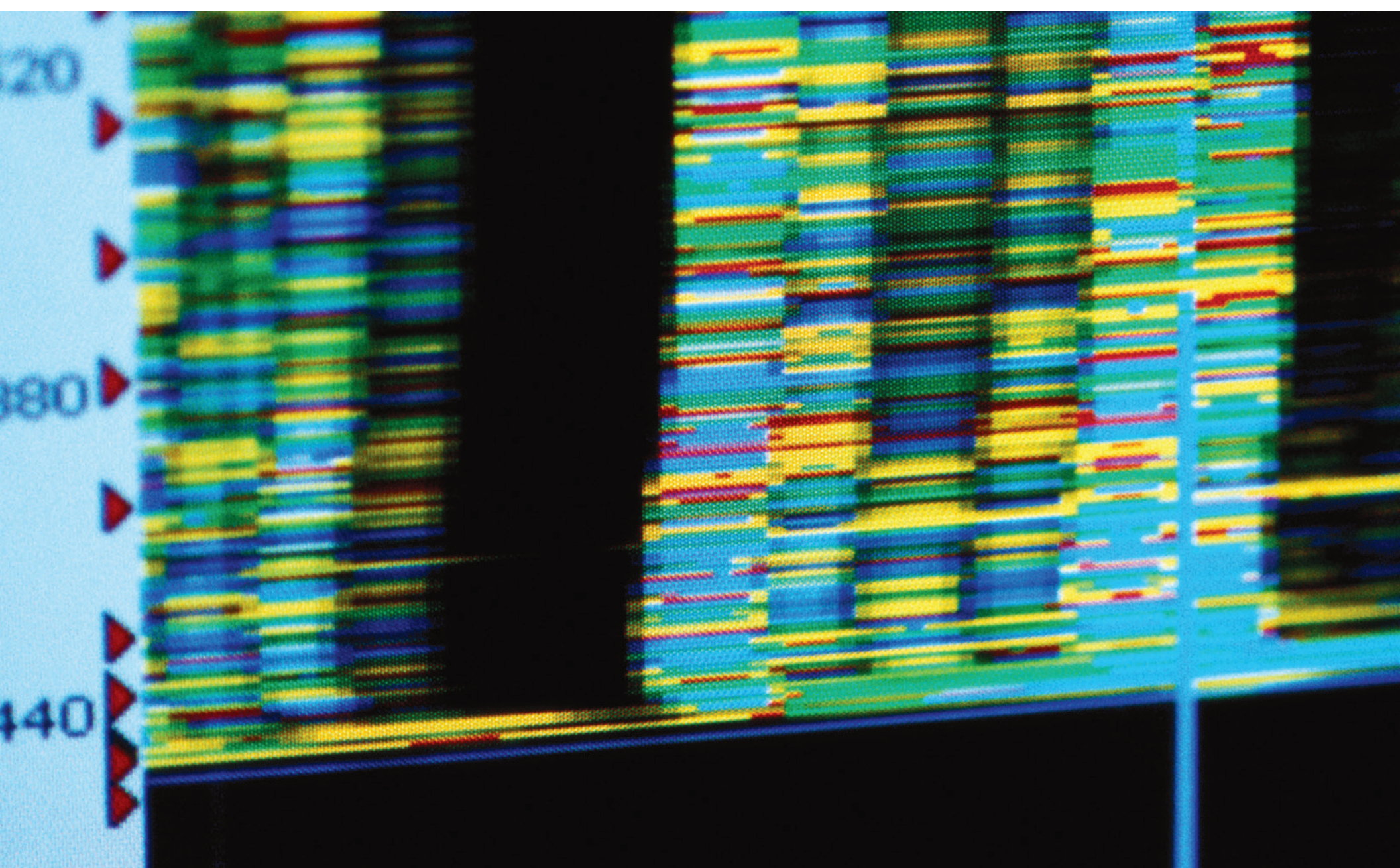
Secondly, Northwestern faculty from several departments are actively engaged in the NIH-funded “Electronic Medical Records and Genomics” consortium called eMERGE. The consortium currently consists of nine sites across the country with DNA biobanks linked to electronic medical records. Together the consortium has nearly 100,000 genotyped individuals. In phase one of the eMERGE project, we demonstrated that data mining of electronic records could be efficiently and specifically used to identify individuals with specific diseases or conditions. Collectively the group completed 14 different studies. In phase two of the eMERGE project, we are performing a large-scale pilot study of genomics-informed personalized medicine. Genetic

variants relevant to drug metabolism will be measured in consented participants and returned to the electronic health record, where treating physicians will be trained to use that information in prescribing and dosing of medications. The goal is to reduce adverse events and improve appropriate dosing.

We plan to expand our large clinical and genomic databases and the information systems required to mine information to expand our ability to sequence individual human genomes and measure environmental factors to provide new insights relevant to the development of new therapeutics, diagnostics, and preventive approaches to human health and disease.

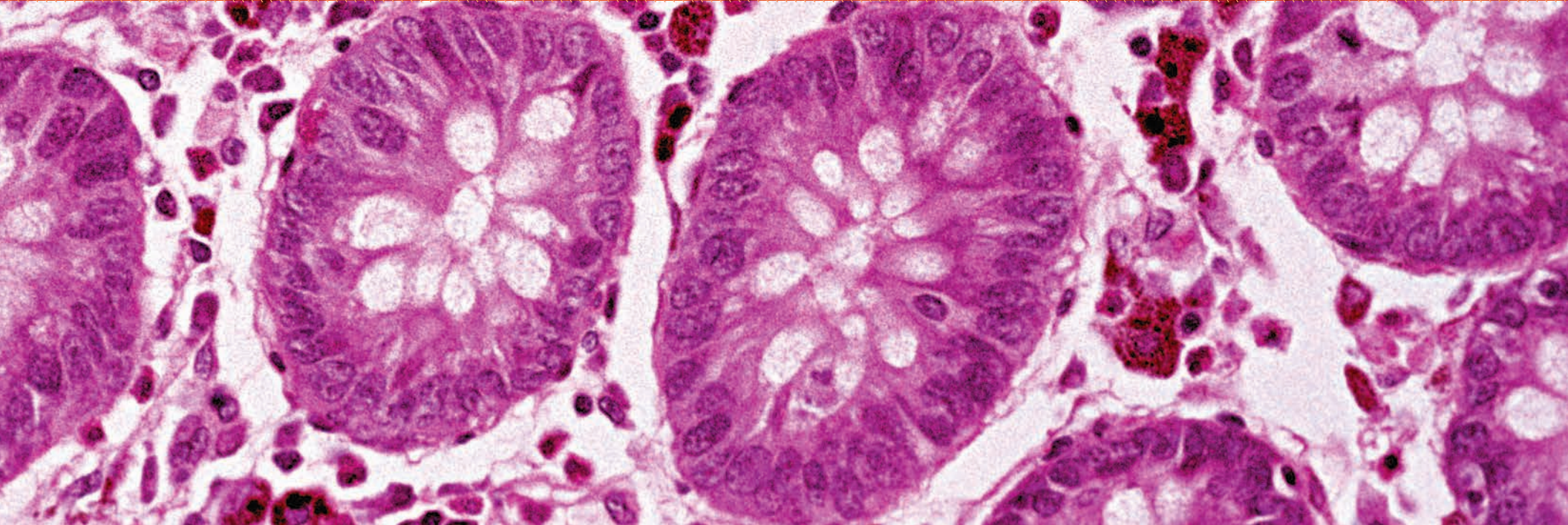


Andrea Dunaif, MD, Charles F. Kettering Professor of Endocrinology and Metabolism, is principal investigator on an NIH-supported Specialized Center of Research on Sex and Gender Factors Affecting Women’s Health to understand Polycystic Ovary Syndrome (PCOS). PCOS is the most common cause of hormonally-related infertility and a leading risk factor for Type 2 diabetes. Dr. Dunaif has taken several genomic approaches to understand the fetal origins of PCOS, suggesting that the in utero environment affects eventual fertility and diabetes risk of women exposed to abnormal hormonal environments. She has undertaken both genome-wide association studies and whole genome sequencing to explore how genetic variation contributes to this condition.



A microscopic image of tissue, likely a histological section, showing cellular structures. The image is overlaid with a semi-transparent orange band that contains the text. The text is in a bold, white, sans-serif font.

**TRANSPLANTATION,
TISSUE ENGINEERING
AND REGENERATIVE
MEDICINE INSTITUTE
AT NORTHWESTERN
MEDICINE**



Northwestern Medicine's solid organ and hematopoietic stem cell transplantation programs are among the leading programs in the world in terms of size and outcomes. Our vision is to become the preeminent locale for patient care, scientific innovation, and training. A finely constructed web of cores and collaboratives unite bioinformatics, bio-repositories, biostatistics, biomarker discovery, and functional genomics with clinical and translational research support, basic and applied immunology, microsurgery and animal models, and clinical and research training.

We also have linked the biologic aspects of transplantation to health and services outcomes in transplantation, highlighting the need to address issues such as disparities in access, and the social benefits of culturally congruent approaches to living donation, health literacy, safety, and medication adherence. We are at the scientific forefront in elucidating the holy grail of transplantation biology: immune tolerance. To overcome the cost and side effects of lifelong immunosuppressive drugs used to prevent transplant rejection, Northwestern has pioneered approaches to maintain transplants without the need

for long-term drug therapy. Exciting recent results suggest that we are near achieving this ultimate goal.

Organ transplantation depends upon the existence of donor organs to transplant. Because of the limited supply of needed organs, Northwestern researchers are also exploring the potential for tissue-engineered organs. Advances in stem cell research and materials engineering create new opportunities to grow and repair human tissues and organs. Cell-based treatments result in improvement and even cure of myriad diseases, including

cancer, inborn errors of metabolism, and autoimmunity. Transplant surgeons and biologists work side-by-side with engineers and industry experts to engineer replacement tissues and organs.

These types of approaches give rise to a new field called Regenerative Medicine. Teams are working to regenerate and replace human cells, tissues, and organs to restore or establish normal function. These healthy cells can be grown outside of the body and used to replace unhealthy, degenerative, or absent cells in the human

body. This research depends upon our ever-increasing understanding of so-called stem cells, which can be used to grow other differentiated cells outside the body for infusion or implantation into patients. Northwestern scientists are at the forefront in testing strategies to use such cells in a variety of diseases. Such approaches have major implications for cancer, cardiovascular disease, central nervous system injury or degeneration, a host of autoimmune diseases including childhood diabetes (Type 1), and inborn errors of metabolism present from birth.

Investigators from chemistry, materials science, chemical and biomedical engineering, neurology, endocrinology, cardiology, hematology/oncology, and transplant surgery collaborate with nanotechnologists who develop synthetic scaffolds to support the growth and interactions of developing cells.



Michael Abecassis, MD, MBA





“Regenerative medicine is one of the great biomedical challenges of the century as we seek to regenerate parts of the human body lost to trauma, disease, and genetic factors,” states **Samuel I. Stupp, PhD**, Board of Trustees Professor of Materials Science, Chemistry and Medicine at Northwestern University and director of the Institute for BioNanotechnology in Medicine at Northwestern.



INSTITUTE FOR PUBLIC HEALTH AND MEDICINE AT NORTHWESTERN MEDICINE



We are facing an unprecedented burden of new and evolving health problems. These problems touch all of our lives, including those of our families and neighbors. We are dealing with an aging population, shifting patterns of diseases related to globalization, sedentary lifestyles, increasing poverty, health disparities, and new epidemics. In addition, chronic diseases—such as cancer, arthritis, heart disease, diabetes, and chronic end-stage kidney and liver diseases—are contributing to increasing disability in our society.

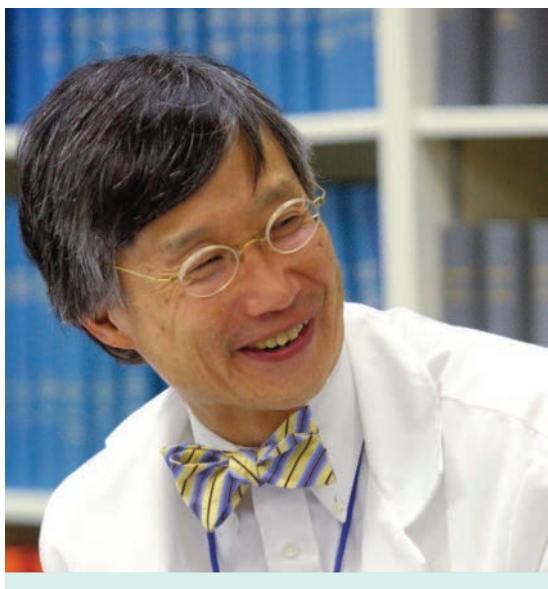
The delivery of healthcare is in need of innovation and public health solutions to address these paramount health challenges. Without dramatic changes in our approach to public health and healthcare delivery, we will confront surging, unsustainable costs and an inability to meet the healthcare needs of our citizens. At Northwestern, we see this urgent need as a tremendous opportunity to provide leadership and a new direction to improve the health of our nation and world.

We are proud to be at the forefront of this critical and timely movement in academic medicine. Northwestern Medicine's Institute for Public Health and Medicine, or IPHAM, will tackle and solve the biggest health challenges of our time.

Northwestern has the faculty leadership, a collaborative mindset, and major departments, programs, and initiatives in place to address healthcare and patient-centered outcomes, epidemiology and prevention of disease, global health, aging, healthcare engineering, and community health.

Most academic medical centers have kept medicine and public health in separate schools and, thus, have limited the synergies that come from uniting these disciplines. Our institute will transcend traditional boundaries among academic disciplines, medical centers, public health programs, and community partners to become recognized internationally for innovative discoveries, dissemination of findings, and training of scholars.

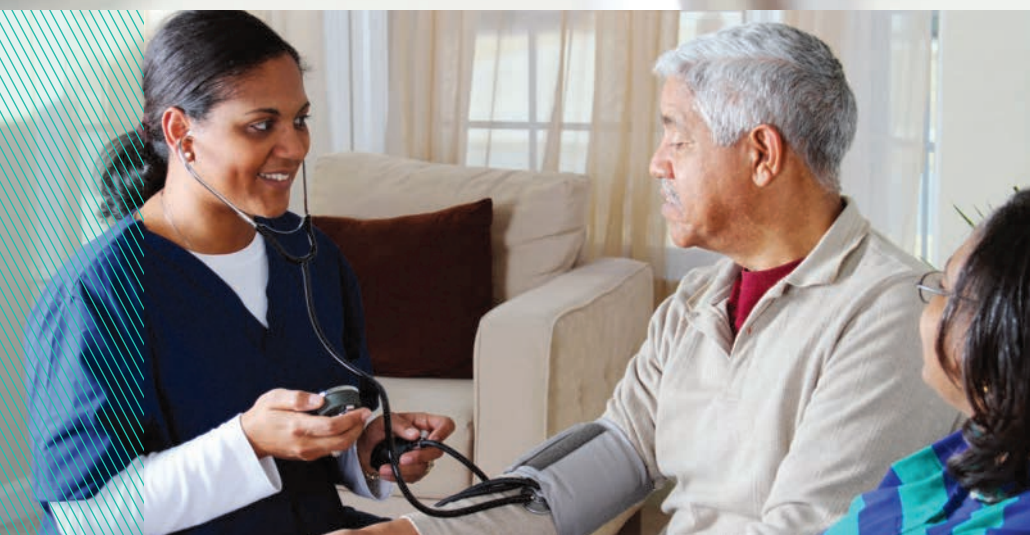
The institute is guided by a mission to improve the health of our communities, our city, and the world by developing and supporting research that combines the best of ideas across disciplines and spans the traditional boundaries of public health and medicine. “We will be known worldwide for excellence in training and research leading to the discovery, demonstration, and dissemination of innovative solutions to the pressing challenges of health and healthcare.” David Baker, MD, MPH, IPHAM deputy director.



Rowland Chang, MD, MPH

Through the Institute for Public Health and Medicine we will:

- Build and support centers and programs that serve as a nexus for innovation, collaboration, and growth in research that focuses on the intersection of public health and medicine;
- Harmonize, develop, and provide value-added resources that enable the institute’s centers, research programs, scholars, and partners to engage within a culture of interdisciplinary collaboration to enhance the feasibility, efficiency, and impact of research;
- Partner with departments across Northwestern to ensure the development and success of diverse professionals who represent a full breadth of health disciplines;
- Align the institute’s research and educational activities with career development, service, and community outreach programs across Northwestern University and its affiliates; and
- Recruit and retain more exceptional students and faculty.





**CLINICAL AND
TRANSLATIONAL
SCIENCES INSTITUTE
AT NORTHWESTERN
MEDICINE**

Northwestern Medicine is dedicated to accelerating the translation of scientific discoveries to improve the health of humankind. Northwestern University Clinical and Translational Sciences Institute, or NUCATS, provides the overarching environment that will bring about coordinated and integrated research planning and implementation. Through this institute, we will improve and accelerate the translation of new knowledge discovered in our basic science laboratories and ensure the conduct of clinical trials aimed at new patient treatment options. This institute provides the resources and personnel from across Northwestern Medicine to increase efficiency, catalyze innovation, and promote interdisciplinary interactions among investigators and staff involved in breakthrough research.



Our institute is one of 60 members of the National Institutes of Health Clinical and Translational Science Award (CTSA) consortium. At every juncture and turn in the research pipeline, our team is there to help physicians and scientists progress and succeed in their research. All stages of basic research and clinical trials require support:

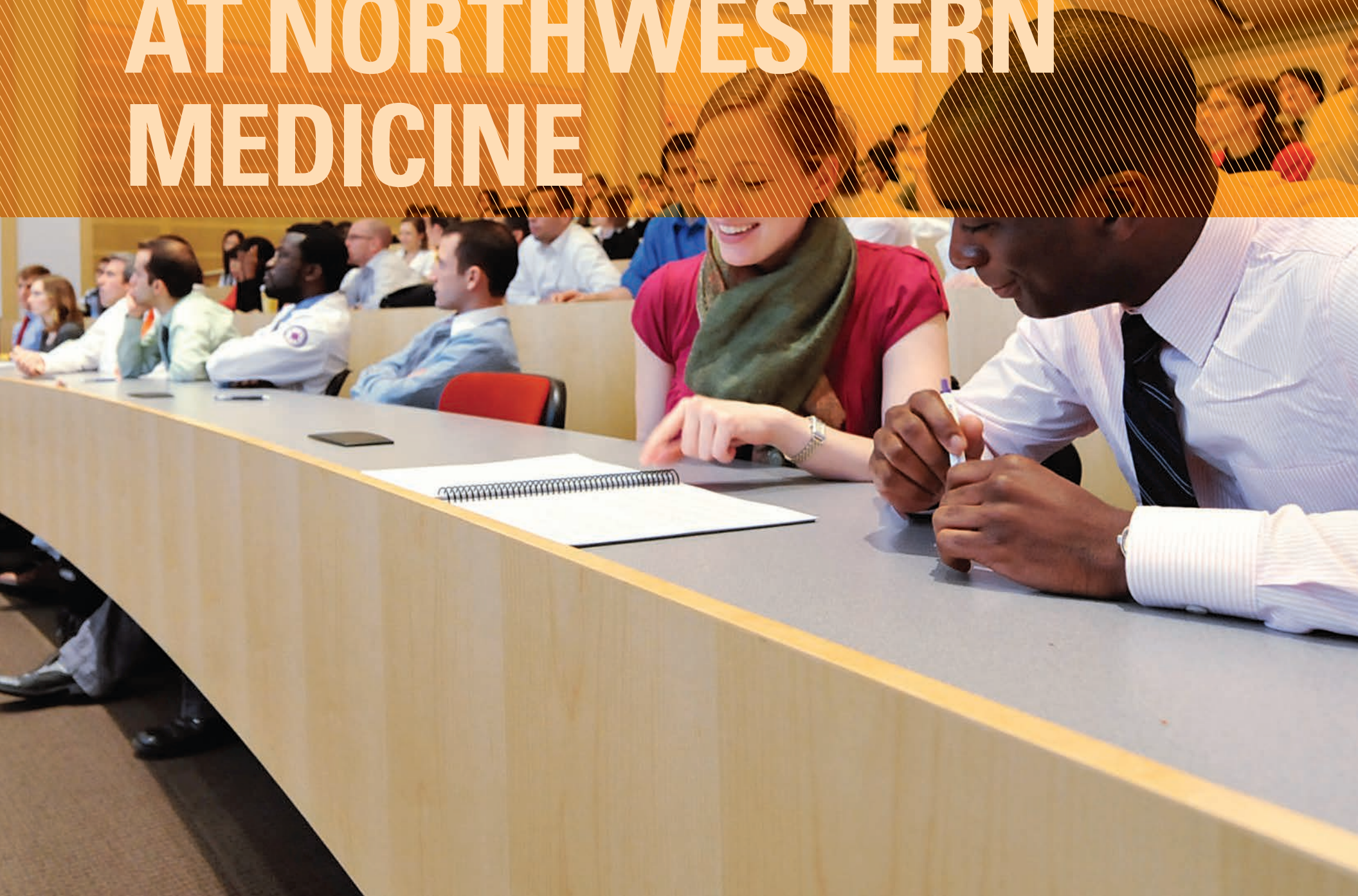
- Guidance on research study design, budget, project team development, and best practices;
- Research navigation to help scientists with transformational new discoveries to translate their findings into improvements in patient care and population health;
- Access to a clinical trials office that serves all clinical and translational research investigators across the University and that helps our faculty design, launch, and track their studies;
- Access to clinical data and software for clinical studies, as well as access to highly specialized statisticians who provide expertise and time on clinical studies;
- Assistance and guidance with necessary and often complex research submissions to Northwestern's Institutional Review Board and with other regulatory matters;
- Facilitation of collaborative research partnerships that include Chicago-area organizations, community-based clinicians, and Northwestern University academic partners;
- Intensive training on the great potential and use of information-rich, 21st century tools including our Enterprise Data Warehouse and Bioinformatics;
- Pilot funding for new high-risk/high-reward projects that address significant, unmet needs and have a direct bearing on clinical problems; and
- Expertise and guidance regarding the inner workings and needed steps to succeed at intellectual property, technology transfer, and commercialization.

The Northwestern University Clinical and Translational Sciences (NUCATS) Institute launched in 2007 with a \$30 million CTSA grant from the National Institutes of Health. It is positioned as the homebase for clinical and translational science at Northwestern Medicine. **Donald Lloyd-Jones, MD, ScM, FACC, FAHA**, senior associate dean for Clinical and Translational Research, and chair of the Department of Preventive Medicine, directs the institute.



Our NUCATS team members have expertise in diverse fields and encourage more frequent interactions that will ultimately accelerate progress and improve the quality of clinical research. Our success will transform how today's most exasperating diseases are understood, diagnosed, treated, and ultimately prevented.

INSTITUTE FOR MEDICAL EDUCATION AT NORTHWESTERN MEDICINE



Throughout our history, Northwestern has championed groundbreaking educational advances. Founded on the ideals of reforming the medical education system in the mid-19th century, we led the way in advancing the education and training of physicians. At a time when a student could enter at will almost any medical school and earn a degree with limited training, our founders rebelled against convention and demanded an extended program, correlated hospital instruction, a graded curriculum, and rigorous requirements for graduation.

Today, Northwestern is well known for excellence in clinical training and innovation in collaborative group learning. Nationally, we are a top school in producing academic faculty. We have charged forward with dynamic educational initiatives to ensure the preparation of well-rounded, highly competent physicians, scientists, physical therapists, physician assistants, and practitioners in prosthetics-orthotics.

While being among the most selective universities in accepted matriculates for our MD program, we similarly receive

accolades for the breadth of our training programs. We were one of the first three medical schools in the nation to receive a grant from the National Institutes of Health establishing the combined MD/PhD Medical Scientist Training Program. Our Prosthetics-Orthotics education program, formed in 1958, has the longest history of any other school, and it remains the largest program of its kind in the nation. Northwestern directs 80 fully accredited residency and fellowship training programs in surgical and medical specialties, with nearly 1,100 trainees per year.



Our Walter S. and Lucienne Driskill Graduate Training Program in Life Sciences serves as an umbrella program for graduate student training in all departments at the medical school. The Medical Humanities & Bioethics Program is a unique and well-known group of scholars and educators interested in the study of

medicine itself, from a sociological, philosophic, and cultural perspective. Northwestern sponsors multiple master's degree programs in areas such as Public Health; Epidemiology and Biostatistics; Healthcare Quality and Patient Safety; Health Services and Outcomes Research; and Clinical Investigation.

Northwestern received a \$10 million grant from the Walter S. and Lucienne Driskill Foundation to endow and name the Walter S. and Lucienne Driskill Graduate Training Program in Life Sciences. This philanthropy supports graduate student training in the life sciences with an emphasis on recruiting superb, highly competitive candidates for the medical scientist training program leading to an MD-PhD degree.



The Simulation Technology and Immersive Learning Center offers medical students, residents, physicians, and other staff from Northwestern and its affiliate institutions a place to practice hands-on clinical care. Our resources include five simulation bays designed to look like a fully-equipped hospital room, two skills laboratories, and

an Innovations Laboratory, offered in collaboration with the McCormick School of Engineering, where new simulation devices are created. With five patient rooms, multiple simulation experiences are performed at once with different groups of learners. Additional space enables participants to capture interactions

in the patient rooms and hallways and allows instructors to evaluate the learners' teamwork and communication skills. Breakdowns in these exchanges are often cited as reasons for errors in real-life patient situations.

To ensure that Northwestern has prepared our graduates for a successful career, we have dedicated resources for the programmatic needs of our degree programs. Philanthropy has been a driving force in our ability to:

- Support exceptional faculty members within all departments and divisions across Northwestern;
- Drive research to disseminate new knowledge in areas of patient safety, compassionate-care communication skills, and other systems-based care;
- Direct financial assistance through scholarships and stipends for all degree programs;
- Respond to an intense interest in healthcare and public health challenges throughout the world. Over 40 percent of our MD students participate in one of our 20+ formal international affiliations. Northwestern provides support for travel, for stipends to enable longer periods in residence in other countries, and for the program's infrastructure;
- Support dedicated space for classrooms, lecture halls, and facilities for education. Northwestern's Simulation Technology and Immersive Learning Center is a national leader in simulation-based education for enhanced healthcare reliability. We research, deploy, and administer immersive educational experiences using innovative healthcare simulations that enhance knowledge, verify expertise, and improve patient outcomes; and
- Provide diversity in terms of student bodies, approaches to learning, and experiences of students and faculty.

**INNOVATION
ENGINES**

**AT NORTHWESTERN
MEDICINE**

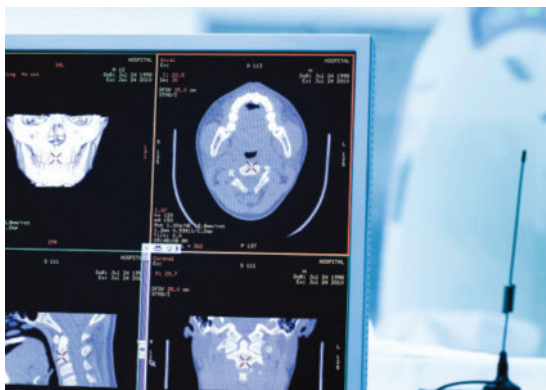


Eight technologic drivers of innovation, known as the Innovation Engines at Northwestern Medicine, interact in a cross-cutting manner with the institutes as a matrix organization.



Venture Space/Entrepreneurship

Moving ideas from the laboratory to impacting patients' lives is part of the Northwestern Medicine culture. Rapid progress from basic science discoveries to proof of principle and lead compounds has been the result of a culture of interaction between physicians, biologists, chemists, physicists, engineers, and other scientists. Northwestern produces approximately 200 inventions a year; approximately 75 percent of these are in therapeutics, devices, and diagnostics. Northwestern has nearly 700 issued U.S. patents and approximately 600 issued foreign patents; more than 900 patents (U.S. and foreign) are pending. We have 30 active start-ups in the life sciences, with 60 percent in medical devices.



Imaging

Northwestern is driven by the recognition that effective diagnostic strategies and therapeutic designs hinge on the confluence of knowledge of how biological and pathological processes work at the molecular and cellular levels and how the pathogenesis cascades unfold at the whole organism level. Our ability to visualize, monitor, and quantify these biological processes is vital to this understanding. We have major investments in four shared resource centers that will continue to provide state-of-the-art imaging capabilities to the research community, and more importantly to serve as the instrumentation and technical foundation upon which the intellectual environment will be fully supported. These core facilities include the Center for Translational Imaging (CTI); Center for Advanced Cell & Molecular Imaging (ACMI); Nikon Imaging Center; and the Center for Image Processing and Analysis.

Information Systems

Our Enterprise Data Warehouse is a single, integrated database that links all clinical and research data through Northwestern Medicine. In our database, we store an amazing two million records with over 240 million clinical observations. Currently, more than 125 investigators—including faculty, students, residents, and post-doctoral fellows—connect with our Enterprise Data Warehouse to secure patient information for their innovative studies. This warehouse will move us faster to clinical trials—shortening the time between discoveries and the introduction of new drugs and therapies to help patients. At Northwestern, we have the opportunity to use the vast, sophisticated resources of our Enterprise Data Warehouse to ultimately devise and lead more clinical trials. More and more, we are collaborating with our colleagues across the nation and world to conduct multi-site studies across institutions, thereby involving many more patients and accelerating the sharing of research knowledge and impact.



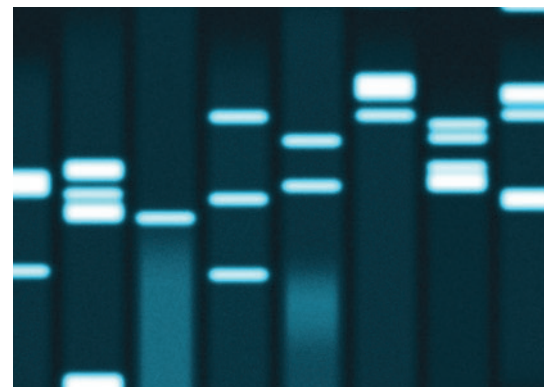


Inflammation/Autoimmunity/Immunology

Inflammatory and immunologic processes are the root cause of most diseases, including arteriosclerosis, allergy, autoimmune disease, infection, and cancer. It is becoming evident that as our exposure to infection decreases in Westernized environments, the incidence of allergic and autoimmune diseases has increased. Understanding the mechanisms through which inflammation is regulated and the mechanisms through which tolerance to our environment and our self is normally controlled and is lost in disease has become a vital area of research. Development of therapeutics that can dampen the inflammatory/immune response or promote tolerance would be applicable to many disease areas within the patient population at Northwestern Medicine, including transplant recipients, cancer patients, allergic individuals, and individuals with autoimmune diseases, including diabetes, multiple sclerosis, and rheumatoid arthritis.

Biotechnology—Genomics/Proteomics

Northwestern's Center for Genetic Medicine supports basic genetics research; the development and utilization of genetically-based diagnostics, therapies, and technologies; academic education; and public outreach. The Next Generation Sequencing Core and Genomics Core within this center are shared resource facilities that provide genomic services to investigators and external users. Our goal is to facilitate the utilization of the state-of-the-art technologies in genomics research by Northwestern faculty and researchers nationwide at a competitive price and in a timely fashion.

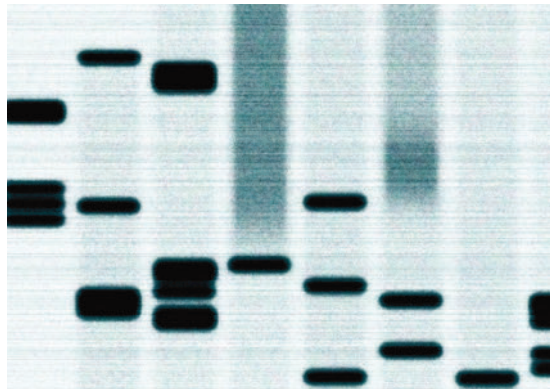
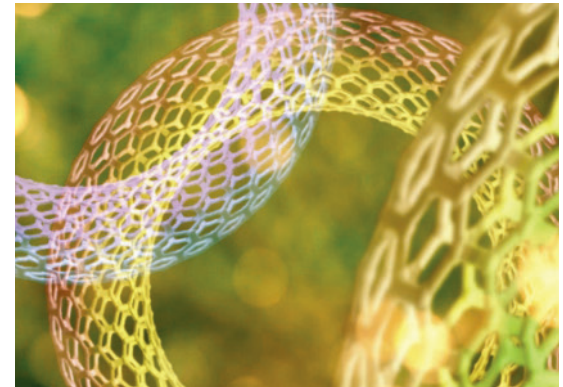


Chemistry of Living Processes/Biochemistry/Structural Biology

Northwestern fosters research that ranges from molecules to whole organisms with a balanced emphasis on chemistry, structure, and biology. We have a long-term research mission to use the knowledge gained from basic science investigations to discover and improve therapeutic strategies. Areas of expertise within Northwestern include: signal transduction, drug design, cellular and molecular neuroscience, macromolecular structure, molecular toxicology, development, genetics, and aging-related disorders.

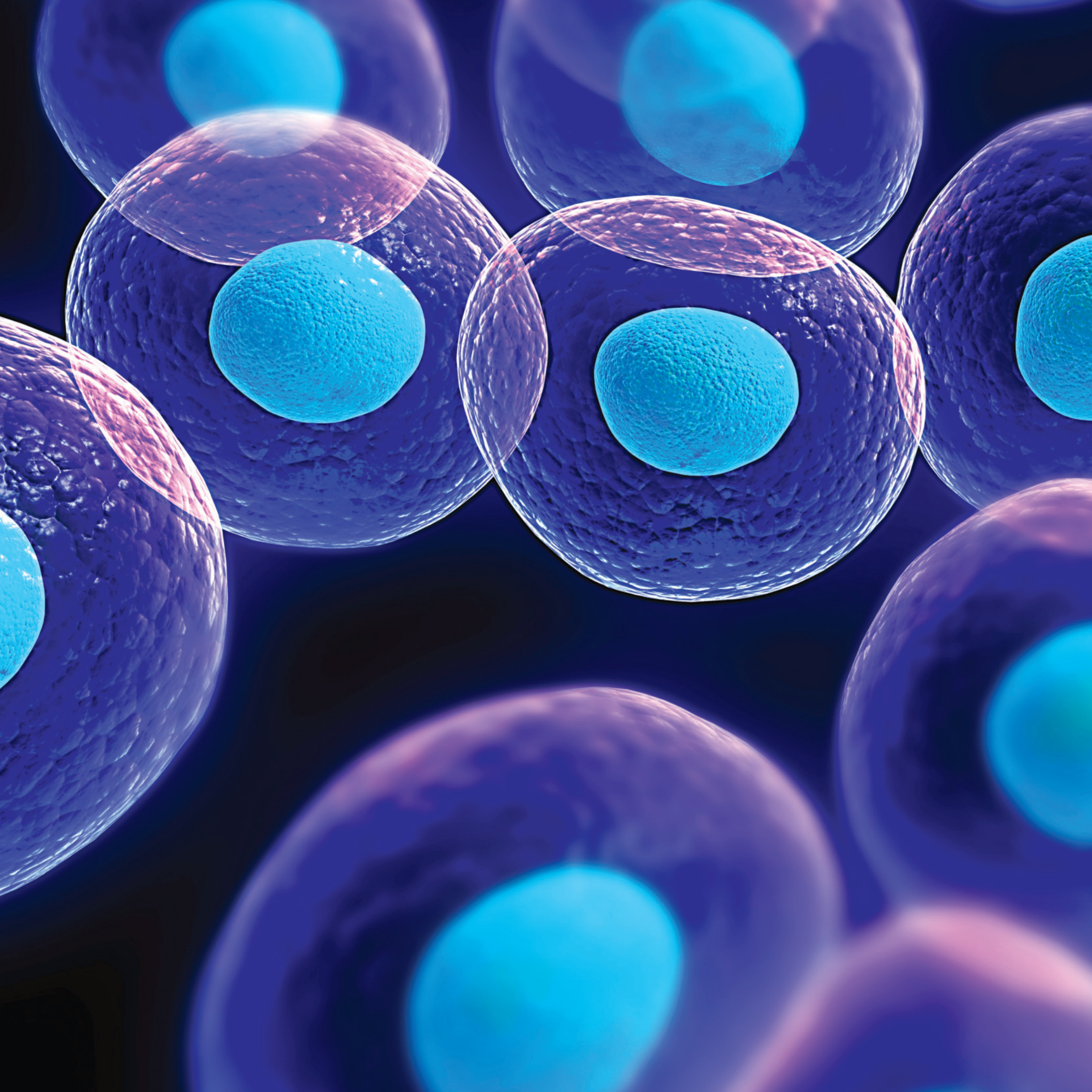
Nano-translational Medicine

Northwestern has emerged as one of the top universities in the world in the field of nanotechnology. The field of nanomedicine has developed over the past decade with the advent of nanotechnology as a research initiative recognized by funding agencies and industries in the U.S. and abroad. Nanotechnology has a goal to create useful materials and devices through the design, synthesis, and characterization of structures with dimensions on the order of 1 to 100 nanometers. Nanomedicine seeks to employ nanostructures to create novel therapies to treat disease and trauma, develop innovative diagnostic devices, and design completely new tools to learn biology and support the development of advanced medicine. Today, a world-class medical school must embrace nanomedicine as a key component of its research enterprise.



Clocks

Biomedical science is poised for a revolution in our understanding of the importance of internal time-keeping (i.e., the Clock) for all life on earth. The precise timing and order of specific events is critical to the function of cells, tissues, and organs, as well as the entire organism. The discovery of genes that keep time (so called Clock genes) has revealed the core mechanisms of regulation of cellular function. The discovery of these Clock genes, in just the past 15 years, has in turn led to the surprising discoveries that the Clock is present in nearly all cells of the body, has a crucial role in regulating cellular processes and physiological systems, and Clock disruption is associated with multiple diseases and pathophysiological states. Northwestern investigators have been central to many of these discoveries. Scientific knowledge generated from the “Clock revolution” will have profound implications with potential to transform modern medicine and clinical care.



OUTPATIENT CARE PAVILION

As the Northwestern medical campus continues to grow to meet patient needs, exciting development plans include a new, contemporary outpatient care pavilion to be constructed and prominently featured at 240 East Ontario Street and 259 East Erie Street—adjacent to Northwestern Memorial Hospital’s Feinberg and Galter pavilions.

Scheduled to open in October 2014, the new Outpatient Care Pavilion will be characterized by an exceptional ambulatory surgery center (operating rooms for outpatient surgeries) and interior spaces that will promote an innovative, integrated environment for physicians as they deliver the highest quality care. Patients will have efficient onsite access to state-of-the-art diagnostics and testing, and will benefit from leading-edge clinical and ancillary services.

The Outpatient Care Pavilion will represent Northwestern Medicine’s exceptional care model of a “one-stop medical shop” and, therefore, will have the potential to redefine healthcare delivery for both the

present and the future. Patients from Chicago and the Midwest and referrals from across the nation will benefit from the convenience of integrated care across numerous specialties and enjoy greatly enhanced clinical outcomes. The new facility will provide a novel, all-encompassing program for coordinated, seamless healthcare. Available services will run the full gamut—from specialty appointments, diagnostics, and testing to myriad treatments and complex, minimally invasive surgery—and will be provided in a single location and, in many cases, during a single visit.

Throughout the new pavilion, patients will experience high-touch, service-oriented

amenities such as an indoor parking structure, retail shops, public transportation, and convenient access to hospital-based services (e.g., imaging and outpatient operating rooms) and programs. Skybridges will connect the new facility with the medical campus, allowing patients and staff to remain indoors while moving from building to building. The pavilion will be built to national green standards through the Leadership in Energy and Environmental Design (LEED) program.

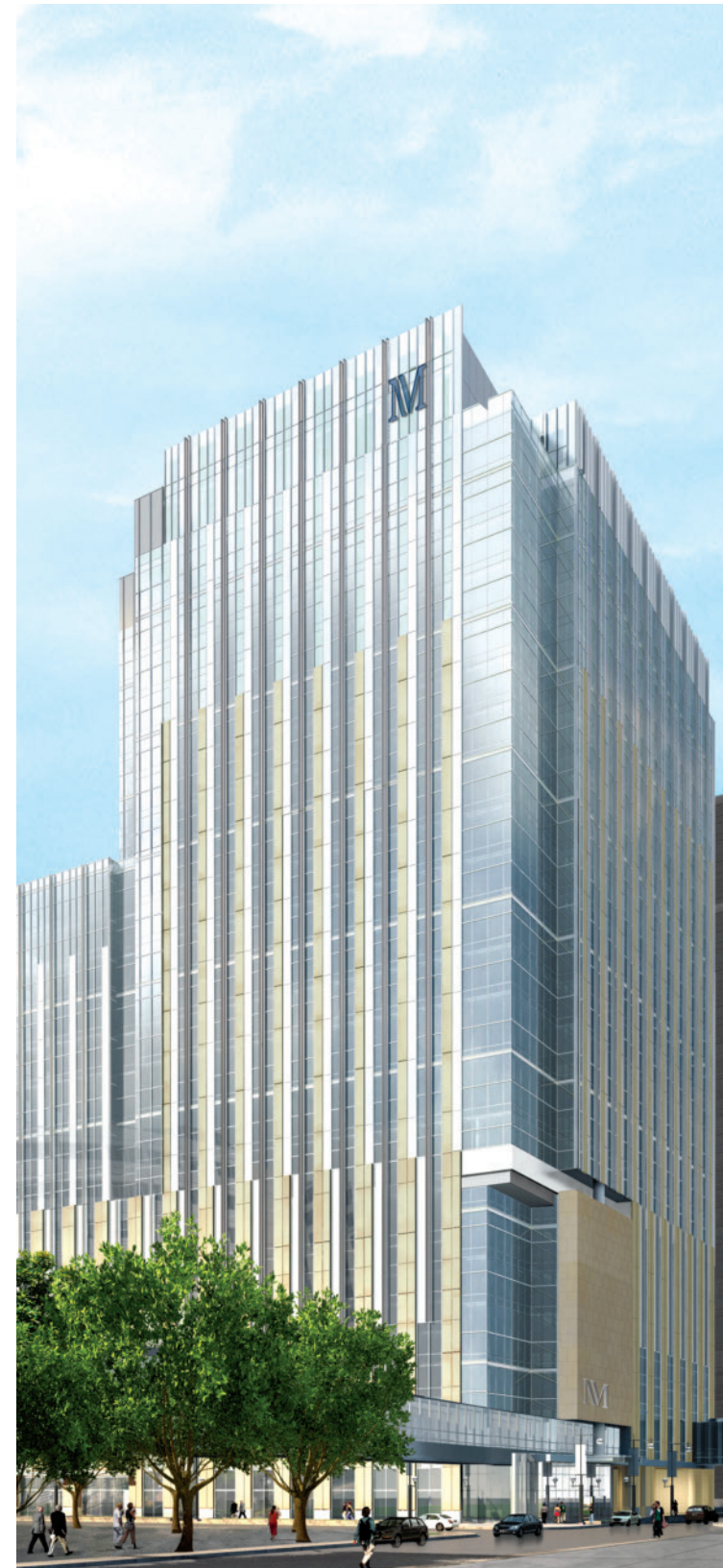
The building will house 25 floors (14 floors of medical space, 2 floors of public and retail space, 2 floors of mechanical space, and 7 floors of enclosed parking). The anchor tenant of the building will be the

THE SYNERGY FROM THESE MULTIDISCIPLINARY COLLABORATIONS IS VITAL TO OUR SUCCESS...

new Musculoskeletal Institute. Featuring specialty clinics for Spine, Sports Medicine, Foot and Ankle, Hand, Shoulder and Elbow, Joints, Trauma, and affiliated specialties, the institute will revolutionize the patient care model, focusing on high efficiency for patients. Currently, patients who come to Northwestern for complex spine surgery are required to travel extensively across campus, visiting several different pavilions for services on the day of surgery. For these patients, who are often unable to walk or stand, a simple elevator ride will enable patient-centered care all within one new pavilion. Other programs such as Diabetes, Regenerative Medicine, and Digestive Disorders are also under consideration for patients with

correlated health needs. Through this multi-faceted process, we will enhance our overall patient services to deliver care that is as thorough, personalized, and timely as possible for every individual.

Notably, the Outpatient Care Pavilion will unite Chicago's finest physicians, who represent many medical disciplines, in a quest to deliver the finest healthcare to our patients. The synergy from these multidisciplinary collaborations is vital to our success, as it helps accelerate discovery; enhance safe, effective, patient-centered care; and facilitate the training of the next generation of healthcare leaders.



MEDICAL RESEARCH PAVILION

Northwestern University Feinberg School of Medicine conducts lifesaving research, ensures the health of Chicago residents, creates jobs, and fuels the Chicago economy. To continue these important missions, Northwestern needs additional wet laboratory space for biomedical research. To address this need, we are planning to construct a 12-story Medical Research Pavilion connected to our Robert H. Lurie Medical Research Center. The pavilion will help us attract the world's best medical researchers and go a long way in helping a world-class city find tomorrow's cures.

The Feinberg School of Medicine is already an international leader in biomedical research, but the relatively small scale of our research enterprise limits our potential for further achievement. We have excellence across basic, translational, and clinical research areas, but our vision is to be one of the elite biomedical research-intensive medical schools.

There are exciting opportunities for growth in new and transformative areas that will help us achieve this vision, a vision where one could say, "only at Northwestern."

This new research facility will provide critical space for investigators working in the areas of cancer, heart disease, neurodegenerative disorders, autoimmune disease and inflammation, diabetes, and

other areas of study where we need more knowledge and answers. Our vision for the new pavilion is to help double the size of sponsored-research activity at Feinberg over the next seven to eight years.

In recruiting top scientists, we will garner \$150 million a year in new biomedical research funding, create 2,000 new



full-time jobs, and generate an additional \$390 million per year in economic activity in Chicago. This facility, located in the heart of Northwestern's academic medical center, will enable new centers of research excellence, create venture space, and generate new start-up companies and scientific discoveries that will save lives and improve health.

Educationally, the research planned for the pavilion will be a draw for the highest quality PhD students and postdoctoral fellows, and provide new research opportunities for medical students, residents, and clinical fellows. They will be attracted to Northwestern because of new centers of excellence that a research building will enable. Trainees are an important part of a feedback loop—they are our seeds for the future. An increased cadre of high-quality investigators also attracts better trainees, who in turn enable

us to retain top investigators and attract even stronger research faculty—all with the effect of increasing the reputation of the medical school and the university.

Feinberg and its affiliated hospitals—Northwestern Memorial Hospital, Ann & Robert H. Lurie Children's Hospital of Chicago, and the Rehabilitation Institute of Chicago—are creating one of the country's top medical centers in Chicago's Streeterville neighborhood. This combination of new hospitals and new research facilities on one campus is essential to building a great academic medical center that will attract patients, physicians, and researchers from around the world.

NORTHWESTERN LAKE FOREST HOSPITAL

For more than a century, Lake Forest and Lake County residents have turned to their community hospital for high quality, compassionate care. Today, Northwestern Lake Forest Hospital is building on this deep-rooted tradition with the unparalleled expertise and capabilities of Northwestern Memorial HealthCare and Northwestern University Feinberg School of Medicine to expand access to Northwestern care in Lake Forest and the surrounding communities. February 2013 marked the third anniversary of the partnership, which brings forth specialty care, nationally recognized physicians, pioneering research, and top-tier performance in quality and patient safety.

As this productive connection grows and deepens, we are pleased to share with you recent developments and future plans that underscore the collaborative philanthropic efforts of our institutions:

Earning National Recognition

- For the eighth year in a row, a consumer study by National Research Corporation named Northwestern Lake Forest Hospital the “Consumer Choice” hospital for Lake and Kenosha counties for having the highest rankings in four categories: best quality, best overall reputation, best doctors, and best nurses. Earning Magnet™ recognition, the hospital is among the country’s six percent of hospitals whose nurses are recognized for providing exceptional nursing care.
- Northwestern Lake Forest Hospital made the *U.S. News & World Report’s* list of top hospitals in the Chicago metro area for high performance in the categories of neurology and neurosurgery, and orthopaedics.

- The Leapfrog Group, an organization that provides the only national, public comparison of hospitals across safety, quality, and efficiency dimensions, selected Northwestern Lake Forest Hospital as a Top Hospital in 2012. The elite group of only 92 hospitals was selected out of nearly 1,200 surveyed.

Experts Making Significant Strides in Patient Care

- The Bluhm Cardiovascular Institute of Northwestern Memorial recently extended its reach to serve residents of Lake County through its partnership with Northwestern Lake Forest Hospital. With the recruitment of Ian Cohen, MD, FACC, FSCAI, medical director of cardiology, and cardiologists Ed Wu, MD, FACC, and J. William Bengé, MD, FACC, the program sees patients in outpatient and inpatient settings and continues to build relationships with referring physicians.
- Hospitalists are now on staff 24 hours a day, seven days a week at Northwestern Lake Forest Hospital, providing a continuum of comprehensive medical care while patients are hospitalized; seeing them in the Emergency Department and into the acute care or critical care unit, if admitted; and organizing post-hospital care.
- Northwestern Memorial Physicians Group is now serving patients in five Lake County locations and bringing exceptional primary care to surrounding communities.

- Northwestern Medicine specialists in the areas of vascular and thoracic surgery, interventional radiology, pulmonary care, critical care, neurology, and surgical oncology are now serving patients at Lake Forest.
- More than 100 physicians have joined the staff of Northwestern Lake Forest, expanding the types and level of services available to patients. In addition, with the hospital’s connection to the Northwestern system, patients now have access to a network of over 2,400 physicians.

A New Hospital for the Future

- The design process to revitalize the 160-acre Lake Forest campus is now underway. In order to provide current and future residents of Lake Forest and Lake County with the advanced care that the community deserves, a new state-of-the-art medical facility is a necessity. HGA Architects and Engineers/ Pelli Clarke Pelli Architects have joined together to create a centerpiece hospital and medical office buildings to replace the current facilities. The project is scheduled to be completed in 2017.
- The satellite outpatient facility at Northwestern Grayslake, which opened its Emergency Center in 2009, Cancer Center in 2010, and Ambulatory Surgery Center in 2011, was recently expanded.





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**“MAKE NO LITTLE PLANS. THEY HAVE
NO MAGIC TO STIR MEN’S BLOOD...”**

ATTRIBUTED TO DANIEL BURNHAM,
CO-AUTHOR OF THE “PLAN FOR CHICAGO,”
1909 CITY ARCHITECT; 1846–1912





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