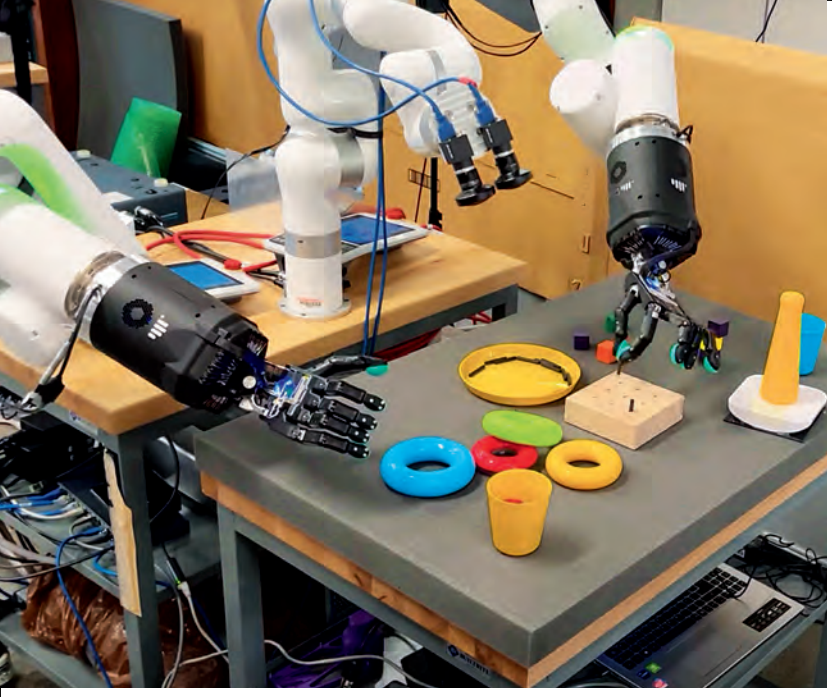

Northwestern | RESEARCH

IMPACT REPORT 2024

Eileen Molony

Northwestern's research enterprise continues to thrive, exceeding $1.05 billion in sponsored funding last year, a 5 percent increase over the previous year and part of 70 percent growth over the past decade. This external funding is a testament to our drive for innovation, collaboration, and impact.

Some 372,000 people participate in our 6,500 active clinical studies that seek to eradicate disease, increase well-being, and extend human life. Northwestern faculty launched 15 startups last year, employing more than 500 Illinoisans. These ventures strengthen communities while producing tools that remove water pollution, detect diseases, and improve sustainable energy sources. The 3,400-plus awards we received this year reflect our faculty's bold vision and resolve to advance human health, tackle global climate challenges, spur manufacturing breakthroughs, and enhance understanding and expression through the arts and humanities.

Numbers tell a compelling story but cannot alone capture the breadth of our impact. The stories in this impact report provide a small sample of the transformative research our faculty are pursuing. At Northwestern, we are redefining what's possible.

Our approach is simple but powerful—and unique. We've designed an ecosystem where researchers collaborate to spark cross-field breakthroughs. For example, expertise converges within our University research institutes and centers (URICs), creating ripple effects beyond any single discipline. Some 700 researchers from over 100 departments come together in our URICs to ignite ideas that transform industries, improve lives, and create lasting global impact. This approach allows Northwestern to lead initiatives like the National Institute for Theory and Mathematics in Biology and Great Lakes ReNEW, both referenced in this report.

Strategic priorities guide our journey and impact. We harness the potential of data science and artificial intelligence (DS/AI), pioneer solutions in decarbonization and new energy, revolutionize the biosciences, and push boundaries in social sciences and global studies. DS/AI, in particular, informs and accelerates our research in many fields—from robotics and biomedical innovation to astronomy. One example appearing in this report: The Engineering Research Center for Human AugmentatioN via Dexterity (HAND) promises to advance robotics and manufacturing.

At Northwestern, we thrive on exciting ideas, rapid experimentation, and vibrant collaboration. We produce breakthroughs that elevate lives, solve real problems, and strengthen society. Reflecting on last year's success, we know the year ahead will shine even brighter.

Eric Perreault
Vice President for Research
Northwestern University

On the cover, clockwise from top left

Northwestern's **National Science Foundation Engineering Research Center (ERC) for Human AugmentatioN via Dexterity (HAND)**—a $26 million collaboration led by robotics and haptics expert Ed Colgate (mechanical engineering) and the first Northwestern-led ERC—will develop **versatile, accessible, affordable robotic hands** for enterprise use. Joining Colgate are research director Kevin Lynch (mechanical engineering and director of the Center for Robotics and Biosystems), collaborators from Northwestern and six other universities, corporate partners, and additional stakeholders. Video still by Northwestern Robotics

Through **SLIPPAGE**, a project exploring the nexus of Black studies and artistic research, Thomas F. DeFrantz (communication studies) reimagines performance by blending cultural narratives with technologies including robots, media, and computer interfaces. His work examines **Black movement traditions** in dance, everyday gestures, and digital performance. With a $500,000 Mellon Foundation grant, DeFrantz is expanding research into Black social dance practices across the US, including their role in shaping cultural and artistic narratives. Photo courtesy of Duke University

Northwestern and the University of Chicago have established the **NSF-Simons National Institute for Theory and Mathematics in Biology (NITMB)**, funded by a $50 million award from the National Science Foundation and the Simons Foundation. Led by Richard Carthew (molecular biosciences), the institute connects researchers to tackle fundamental life sciences questions about cellular dynamics, evolutionary processes, and ecological interactions and to produce **mathematical discoveries**. The NITMB also addresses societal challenges like disease progression and biodiversity conservation. Image by Richard Carthew

Stephanie Edgerly (journalism) studies "news avoidance" among teens and young adults. Her research delves into **the motivations behind—and democratic implications of—youth disengagement from news consumption**. Edgerly offers strategies for newsrooms to better engage young audiences, including diversifying content formats, personalizing the news, combating mistrust by transparently explaining how journalism works, and tapping into social media. Photo by Eileen Molony

The **Northwestern University Clinical and Translational Sciences Institute (NUCATS)** received a $55 million National Institutes of Health award, the largest active research grant at Northwestern. The Feinberg School of Medicine's Richard D'Aquila (infectious diseases), Sara Becker (psychiatry), and Clyde Yancy (cardiology) are leading the research. The seven-year grant aims to bridge research and clinical care, strengthening clinical care through evidence-based interventions like resources and training. NUCATS unites Northwestern schools with health systems and community partners to ensure medical breakthroughs benefit everyone. Photo by GettyImages TEK/Science Photo Library

Northwestern | RESEARCH

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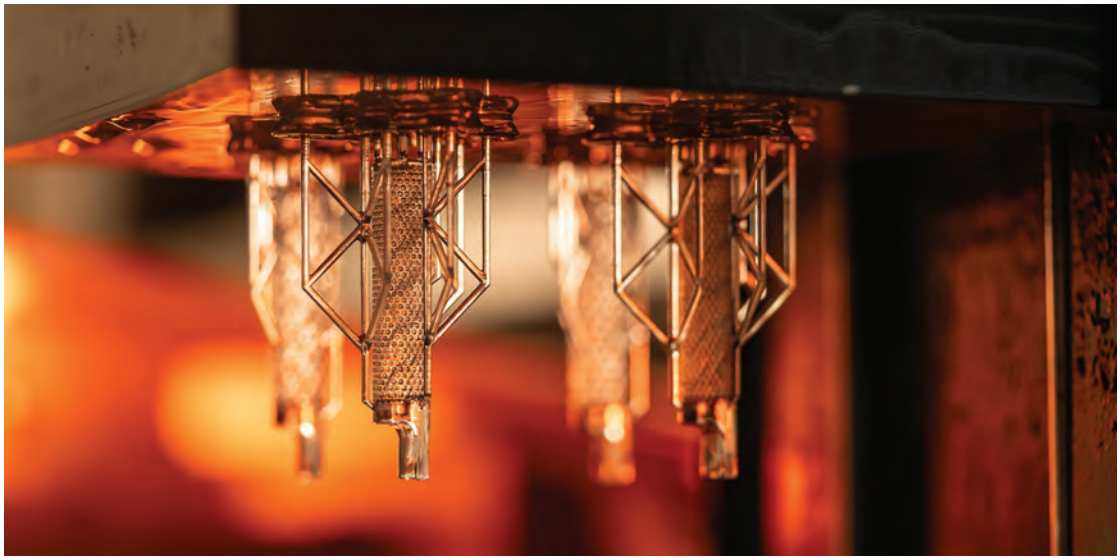


Photo by Brandon Martin/Rice University

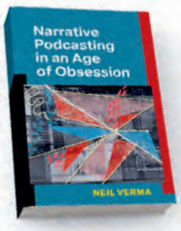
Measuring just a few millimeters in diameter, the implant will house living engineered cells that synthesize and deliver the therapies when needed, eliminating the need for injections, trips to the pharmacy, and storage of medications.

OBESITY AND DIABETES IMPLANT TO TRANSFORM TREATMENT

The **Advanced Research Projects Agency for Health (ARPA-H)** has awarded up to $34 million to a multi-institutional team of researchers, including two Northwestern engineers, to fast-track the development of a bioelectronic implant for treating obesity and type 2 diabetes. Co–principal investigators **Jonathan Rivnay** (biomedical engineering) and **Josh Leonard** (chemical and biological engineering) will design a millimeter-scale device housing living engineered cells. These cells will synthesize and deliver biological therapies on demand in response to patient needs, controlled by advanced sensing and genetic control mechanisms. The implant could eliminate the burden of frequent injections and expensive medications for millions of patients. The project, which reduces healthcare costs and improves treatment accessibility, underscores Northwestern's commitment to advancing personalized, patient-centered technologies.

EXPLORING THE CULTURAL SOUNDSCAPE

Neil Verma's (communication studies) latest book, ***Narrative Podcasting in an Age of Obsession*** (2024), offers a comprehensive analysis of the history, theory, practice, and cultural impact of podcasting. Drawing from more than 300 shows and thousands of episodes, Verma highlights how podcasts create intimate connections between creators and audiences by blending traditional storytelling techniques with innovative digital formats, thus reshaping how narratives, identities, and public discourse are constructed. His work advances Northwestern's contributions to media studies and creative storytelling.



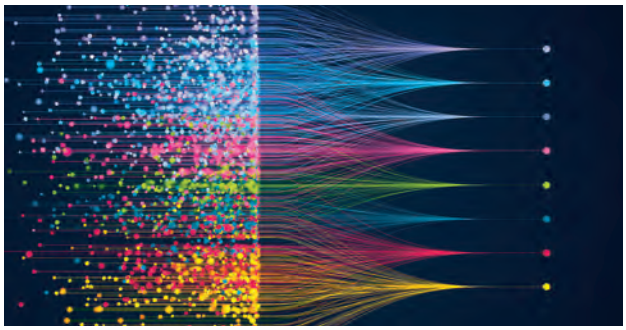
EMPOWERING TEENS THROUGH SOCIAL MARKETING

Pre-exposure prophylaxis (PrEP) is a daily medication that reduces the risk of acquiring HIV by up to 99 percent. The **PrEP4Teens campaign**, a Chicago-area initiative led by **Kathryn Macapagal** (medical social sciences) and Jim Pickett (senior adviser, AIDS Vaccine Advocacy Coalition), educates teens about sexual health and encourages them to access care. Funded by the Chicago Department of Public Health, the Alphawood Foundation, the Northwestern University Clinical and Translational Sciences (NUCATS) Institute, and the Third Coast Center for AIDS Research, the campaign creatively combines art, advocacy, and science by collaborating with local artists to design engaging, teen-focused digital content that communicates the benefits of PrEP. These efforts, informed by research and aligned with community needs, reach teens outside traditional clinical settings, addressing critical healthcare disparities.

Jim Pickett and Kathryn Macapagal

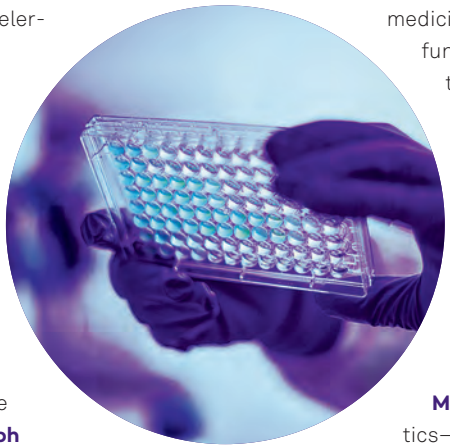
DATA MINING FOR THE NEXT BIG IDEA

Led by **Dashun Wang** (management, industrial engineering), an interdisciplinary Northwestern team is using advanced machine learning models to better identify, measure, predict, and accelerate research innovation. A $20 million National Science Foundation grant supports this data-driven initiative. Artificial intelligence (AI) tools integrate data from sources like scientific articles, patents, and clinical trials; explore datasets to uncover overlooked ideas, technology trends, bottlenecks, market outcomes, and potential breakthroughs; and guide decision makers to meaningful interventions. Key contributors, who span the Kellogg School of Management and the McCormick School of Engineering, include **Ben Jones**, **Brian Uzzi**, **Alicia Loffler**, **Jian Cao**, and **Mark Hersam**.



RYAN FAMILY SUPPORT SPEEDS INNOVATION AND TRANSLATION

The Ryan Family Research Acceleration Fund, a $35 million initiative of Northwestern and the Ryan Family Foundation, accelerates life sciences research with immediate societal impact. To date, the initiative has awarded more than $4 million annually, supporting 16 transformative projects from a pool of 139 proposals submitted by Northwestern researchers. In Round 2, 67 proposals were reviewed, resulting in more than $2 million in awards to eight projects. These include pioneering work by **Joseph R. Leventhal** (surgery), who is developing a first-of-its-kind approach to improve organ transplant outcomes by inducing delayed immune tolerance using regulatory T cells. Other funded projects include drug discovery, regenerative medicine, and AI applications. This funding helps researchers overcome the crucial early phase of financial pressure (the so-called "valley of death") in translational science and secure private-sector or government funding. Projects that were supported in Round 1 —such as **Xinlong Wang**'s injectable cardiac patch, **Bradley Allen**'s deep-learning aneurysm intervention, and **Milan Mrksich**'s Alzheimer's therapeutics—exemplify how the acceleration fund drives innovation and commercialization, harnessing the strengths of Northwestern's engineering, medicine, and liberal arts schools.



UNRAVELING THE LONG-TERM HEALTH IMPACTS OF INCARCERATION

Linda Teplin (psychiatry, medicine, medical social sciences) leads a $19.9 million National Institutes of Health–funded study examining the **long-term health consequences of incarceration**. Building on her pioneering longitudinal research on incarcerated youth and adults, Teplin's new study will explore how incarceration influences health outcomes over the life course. Using a unique dataset of 21,000 interviews with nearly 2,000 people, her study addresses critical age-related health disparities, particularly among marginalized populations, while examining the intersection of incarceration and social justice. Insights from this research will inform policies that improve health equity and outcomes for individuals in the justice system.

NORTHWESTERN POWERS WATER INNOVATION IN THE GREAT LAKES REGION

Northwestern is a core partner in the National Science Foundation–funded **Great Lakes Water Innovation Engine (ReNEW)**, a consortium that has received up to $160 million to advance water-related technologies and drive regional economic growth. ReNEW intends to attract water-intensive manufacturers, recover energy and minerals as well as purge toxic forever chemicals from wastewater, and create workforce opportunities. Northwestern's co–principal investigators, **George Wells** (civil and environmental engineering) and **Vinayak Dravid** (materials science), lead ReNEW's process technologies thrust, developing next-generation wastewater treatment systems. **Aaron Packman** (civil and environmental engineering and director of Northwestern's Center for Water Research) and **Nichole Pinkard** (learning sciences) contribute expertise in safe water reuse and workforce development, ensuring the initiative fulfills environmental and economic priorities.

UNLOCKING THE SECRETS OF HEALTHY AGING

Northwestern has been awarded $32.4 million by the Hevolution Foundation to investigate **proteostasis**, the cellular processes that maintain protein health and prevent diseases caused by protein misfolding. Led by **Rick Morimoto** (molecular biosciences), who studies cellular stress responses, this research uncovers the mechanisms that protect cells from the damage to proteins associated with aging. Morimoto's work has significantly advanced our understanding of how cells manage protein folding and stability, processes critical for preventing diseases like Alzheimer's, Parkinson's, and Huntington's. By identifying pathways to enhance proteostasis, this research aims to promote healthy aging and develop strategies to combat age-related diseases, extend health spans, and address some of society's most pressing medical challenges.

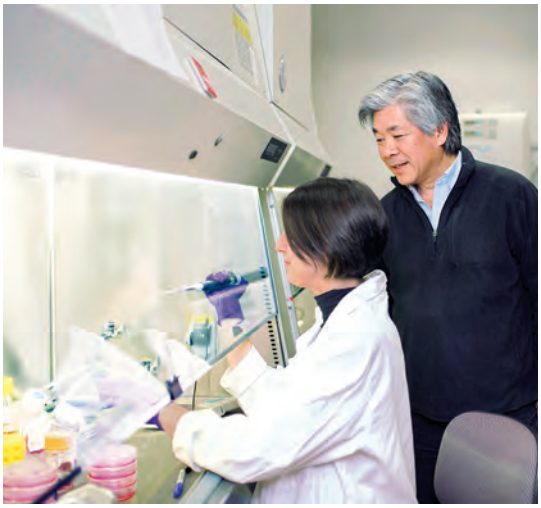


Photo by Monika Wnuk

Richard Morimoto works with a postdoctoral fellow in his lab's cell culture room.

3,413
TOTAL AWARDS IN FY24

$1.05 BILLION
FY2024 TOTAL SPONSORED AWARDS

#6
NATIONAL UNIVERSITY RANKING
US News & World Report *Best College Rankings*

145
PATENTS ISSUED
Innovation and New Ventures (INVO), Northwestern

29
HIGHLY CITED RESEARCHERS
Clarivate

#11
GLOBAL INTERDISCIPLINARY SCIENCE RANKING
Times Higher Education *and Schmidt Science Fellows*

250
INVENTION DISCLOSURES
Innovation and New Ventures, Northwestern

372K+
ENROLLEES IN CLINICAL TRIALS
Feinberg School of Medicine, Northwestern

15
NORTHWESTERN STARTUPS LAUNCHED
Innovation and New Ventures, Northwestern

#29
RESEARCH AND DEVELOPMENT EXPENDITURES
*Higher Education Research and Development Survey, National Center for Science and Engineering Statistics, 2023**

$5.3M
IN FUNDS RECEIVED FROM INNOVATION LICENSING
Innovation and New Ventures, Northwestern

190
TOTAL ACADEMY MEMBERSHIPS

107
AMERICAN ACADEMY OF ARTS AND SCIENCES MEMBERS

14
NATIONAL ACADEMY OF MEDICINE MEMBERS

21
NATIONAL ACADEMY OF ENGINEERING MEMBERS

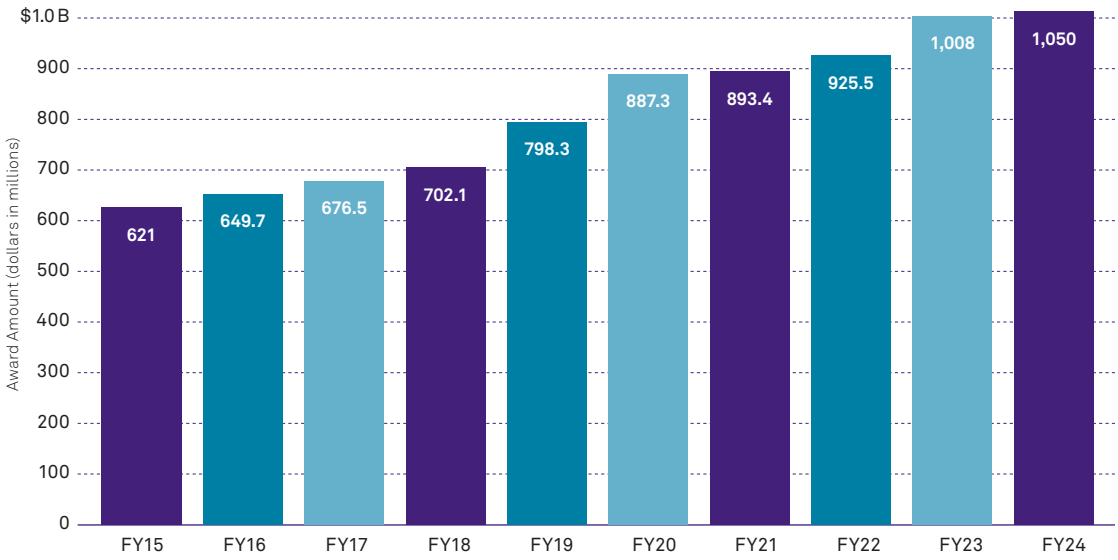
17
NATIONAL ACADEMY OF EDUCATION MEMBERS

31
NATIONAL ACADEMY OF SCIENCES MEMBERS

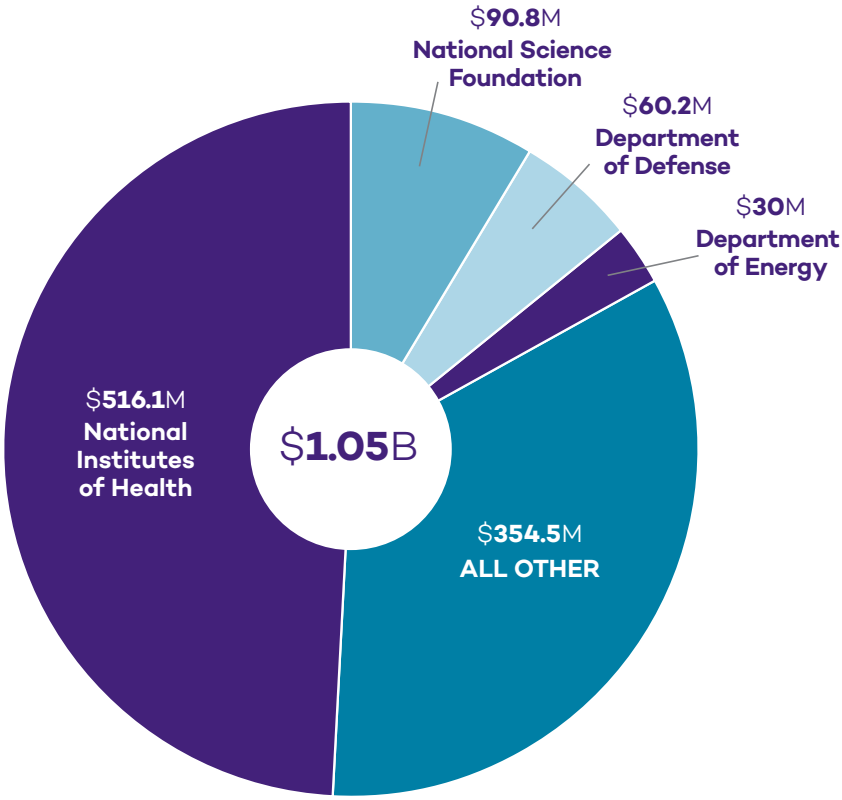
**The most recent survey collected R&D expenditure data from 914 US colleges and universities that spent at least $150,000 on R&D in the prior fiscal year.*

RESEARCH AWARD GROWTH 2015-24

70% growth over 10 years



AWARDS BY SPONSOR FY2024



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CAPTURING CARBON FOR CLEANER AIR

The **Midwest Nuclear Direct Air Capture Hub (MINDAC)**—led by **Jennifer Dunn** (chemical and biological engineering) along with co–principal investigators **Ted Sargent** (electrical and computer engineering), **Omar Farha** (chemistry), **Mar Reguant** (economics), and **Brad Sageman** (earth and planetary sciences)—is advancing carbon capture technology to combat climate change. Funded with $4 million from the Department of Energy and other sources, MINDAC is unique in integrating direct air capture technology with zero-emission nuclear energy, creating a scalable, sustainable method for removing one million metric tons of carbon dioxide from the atmosphere annually. By using the Midwest's robust fleet of nuclear energy facilities, MINDAC reduces greenhouse gases and demonstrates how existing infrastructure can drive climate solutions. This initiative reflects Northwestern's commitment to decarbonization as a core institutional research priority, reinforcing its leadership in clean energy innovation.