Collaborative Science Helping Solve Alzheimer’s Puzzle

Before a single memory fades, Alzheimer’s disease has already wreaked havoc on the brain.

“We now know that the biological changes of dementia begin 10 to 20 years before they are measurable with current neuropsychological testing tools,” says Sandra Weintraub, psychiatry and behavioral sciences. “The challenge for researchers is to develop tests that are more sensitive to these early changes. When people can’t remember where they live, the disease has pushed them well past the potential for treatment.”

One of Weintraub’s most successful assessment tools for checking dementia caused by neurodegenerative disease is known as the Three Words, Three Shapes Test.

“We do not warn individuals that we are assessing their memory before showing them a series of word-shape pairs to test their ability to learn new information,” explains Weintraub, who is a core member of Northwestern’s Cognitive Neurology and Alzheimer’s Disease Center (CDNC). “The test differentiates normal agers from those with possible neurodegenerative disease. The brain of a normal ager can typically remember most of the pairings without conscious effort.”

While people with Alzheimer’s disease may have difficulty remembering items without being primed, those suffering from primary progressive aphasia (PPA) have specific difficulty with...
Word retrieval. Both are irreversible disorders that result from progressive brain disease.

“What’s interesting with PPA patients is that their memories are fine in the earliest disease stages, but they progressively lose their ability to talk, read, and write,” says Weintraub.

Weintraub and other members of the CNADC continue to differentiate the two diseases. A 2012 study led by then-PhD student Tamar Gefen, a CNADC postdoctoral fellow, discovered that PPA can arise as an atypical form of Alzheimer’s, making it a subtype of that ailment.

“The idea that Alzheimer’s disease can present in nontraditional ways, leading to a language-based dementia as opposed to a memory-based dementia, was an important discovery,” says Gefen. “The finding was certainly aided by the CNADC’s design, which allows students and faculty from multiple disciplines to collaborate to attack serious health concerns from many perspectives.”

Gefen is one of four postdoctoral fellows conducting research at the CNADC, contributing her expertise in neuropsychology to complement her colleagues’ knowledge of behavioral neurology and cell and molecular biology.

“The beauty of the center is that the people here are brought together not by their discipline but because of the questions related to aging and dementia that they’re interested in answering,” says center director M. Marsel Mesulam.

Students in Weintraub’s lab play a critical role in furthering Northwestern’s research and educational missions. Because many of them will become physician scientists, their projects typically involve cognitive aging and dementia, Weintraub says. Students are mentored to devise their individual research projects and encouraged to present their findings at professional conferences and in prestigious journals.

Gefen has worked with numerous CNADC faculty members, publishing research in Neurology, the Journal of Neuroscience, and other important peer-reviewed journals.

She intends to pursue a career in translational research on neurodegenerative disorders and dementia.

“We are just starting to figure out that there are different variations of Alzheimer’s disease,” says Weintraub, who recently led the Cognitive Domain team of the National Institutes of Health (NIH) Toolbox for Neurological and Behavioral Function. In that project, she helped develop tools to improve and standardize measurement of cognition, emotion, and sensory and motor functions across disparate studies.

Richard Gershon, medical social sciences and principal investigator of the NIH Toolbox project, has since adapted some of the tests for accessibility on handheld tablets.

“Using computers for neurological testing is a huge advantage for researchers and clinicians, as these digital tools are much more sensitive in detecting some of the early cognitive changes predictive of later dementia,” says Weintraub. “We can measure reaction times in milliseconds, a level of detail that may potentially help diagnose a problem 10 years earlier than it would be otherwise.”

Patients in Weintraub’s study also underwent MRI scans to detect physical brain changes. That aspect of the research was conducted with Emily Rogalski, a neuroimaging expert at the CNADC.

“From the minute I got here, it was clear Northwestern was a collaborative atmosphere,” says Weintraub, who joined the University faculty in 1994. “People are genuinely interested in working together, and I have formed amazing partnerships across both our Chicago and Evanston campuses.”

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Fundraising Effort to Aid CNADC Research

Northwestern Medicine recently announced an initiative to raise $10 million to provide vital additional space for the Cognitive Neurology and Alzheimer’s Disease Center in a setting designed to integrate clinical with basic research.

Read more.
Research doesn’t occur in a vacuum — even when a particular lab experiment makes use of a vacuum.

At Northwestern, much of our high-impact research flourishes thanks to great collaborations among faculty, students, and staff. This indisputable fact is on fine display throughout this edition of Research News. Together, we create a dynamic ecosystem of discovery that extends across disciplinary boundaries to find answers to important questions. We’re also exploring entirely new kinds of questions as we keep extending the parameters of our investigations to advance many knowledge domains.

How we ask and answer questions requires creativity and intelligence. It also requires care and precision. While our research is bold, it is done with care. The Office for Research Safety (ORS) is the key administrative team that provides state-of-the-art guidance on general lab safety to help protect Northwestern researchers from hazards associated with their inquiries. These include lasers as well as biological, chemical, and radioactive agents. And, I would note, ORS’s efforts extend to the arts, where the tools and materials used can be as dangerous as those encountered in the lab.

Since 2012 ORS has reinvented itself to better serve our community. For example, ORS successfully orchestrated “The Great Clean-Up,” a major effort to improve hazardous waste management and began removing old, unwanted, and legacy wastes from the University’s teaching and research facilities. This initiative provided the additional benefits of recycling unwanted or obsolete equipment, scrubbing fume hoods, and improving housekeeping and chemical hygiene.

Today, our safety program helps ensure that up to 50 percent more waste is removed promptly after collection each week. ORS also provides additional supplies and services making the process more convenient for faculty, staff, and students.

ORS contributes to University-wide training, too. Last fall, an interdisciplinary team implemented a new learning management system called “Learn@Northwestern.” This platform currently provides support to ORS and the Office for Research Integrity. ORS is continuously updating and improving its training courses to better reflect the needs of our scientists. They have innovated by regularly putting safety videos online. Eventually, the entire Northwestern community will have a single resource for administrative, compliance, and professional development training.

Finally, ORS is launching a major effort to improve and simplify the compliance process. In 2016, the team will be modernizing the Northwestern Safety Information System. Improvements over the next two to three years will begin to appear in the research registration, lab inspection, and system administration processes, making these easier for everyone involved. And, because the ORS team plays a leadership role in national forums, training done here will facilitate collaborative efforts in laboratories across the country.

As we begin a new year, Northwestern continues to distinguish itself as a top research institution, thanks to the combined efforts of many talented people at the University. I hope the months ahead are filled with discovery and success for each of you!

Vice President for Research

Jay Welsh
Origins: Exploring the Journey of Discovery
Amanda Saratsis sees new hope for treating pediatric cancers, thanks to technological and surgical advances

Amanda Saratsis, neurological surgery, seems optimistic and projects a gracious, compassionate spirit. She might be forgiven if she didn’t, though, since she’s confronted daily by the grim medical prognoses of pediatric brain tumors.

Her research and clinical practice involve treating high-grade and brainstem glioma — specifically, diffuse intrinsic pontine gliomas and glioblastoma multiforme — solid body malignancies with a median survival rate between 15 months and three years.

What does inspire this pianist-turned-physician are recent advances in molecular biology and neurosurgery that could improve the lives of those afflicted by rare but devastating cancers. Over the last five years, technology has enabled physicians to obtain and analyze tissue specimens they previously couldn’t. This, combined with next-generation genomic sequencing, is heralding “huge advances in neuro-oncology,” including new surgical protocols and clinical trials, says Saratsis.

Her patients and their families, of course, also motivate Saratsis and the research team in her laboratory at Northwestern’s Feinberg School of Medicine. The group studies pediatric brain tumors to identify and test novel molecular targets for more effective therapies.

“I’m in awe of these kids,” says Saratsis. “They are so strong and just want to be well, and they believe that they are going to get better.”

Born and raised on Chicago’s South Side, Saratsis comes from a blue-collar background: “There were pipe fitters and teachers in the family, but no doctors,” she says. “My dad, who worked for the phone company, taught me the value of hard work and a job well done.” Her passion for discovery was encouraged early, including through nature walks with her mother and “experiments in the kitchen sink.” As a girl in the 1980s, Saratsis showed unusual interest in human genetics and HIV after watching a documentary on the subject, so her parents brought her to the library to learn more, and even arranged for their pediatrician to share some insights.

During high school, in her first job as an activity therapy assistant in an Alzheimer’s ward, Saratsis played tunes from the 1930s for patients who “couldn’t remember the faces of their children but would remember the words to these songs,” she says. The experience helped shape her decision to attend Northwestern, where she pursued a double major in piano performance and molecular biology before going on to earn a medical degree from the University of Illinois-Chicago.

As a KL2 scholar in the Multidisciplinary Mentored Career Development Program of the Northwestern University Clinical and Translational Science Institute, Saratsis will spend the next two years expanding her investigation into histones (a type of protein) and their role in pediatric brainstem glioma. Research News spoke with Dr. Saratsis about her professional path.

What initially oriented you toward a science career?
I grew up in an environment where there was discovery everywhere. My parents constantly fostered my curiosity. I’d ask a question and my mom would say “let’s go learn about it.” One time we went to the pediatrician’s office and there were microscopy pictures on the wall — images of dust mites and blood cells. I went home and drew them. I entitled them “the lung problem” and “the throat problem.” Then there’s my dad, the quintessential handyman. We were always fixing things — plumbing, electricity — taking things apart and figuring out how they worked. That was kind of my “play.”

When I was in third grade, my family watched an HIV documentary. This disease that hijacks the body’s normal processes fascinated me. There was something tragic and poetic about that to me, even as a child. Our bodies are amazing yet fallible in their complexity. This interest led to my exploring the physical substrate of disease.

You were so young. Were you frightened by these sobering forays into medicine?
As a kid, there’s wonder and mystery all around you, but you take for granted that you’re going to be healthy and that people know how to fix things when they go wrong. So learning about HIV really was an eye-opening experience. It scared me a lot. Yet, all these doctors and scientists working to help these very sick people also impressed me. Because of my parents’ support, and my natural response to something I don’t understand, I wanted to learn more about this disease and in doing so make it less frightening.
Does that strategy still inform your research?

Very much. I work with families each day whose children have devastating illnesses with terrible prognoses. But in mastering my subject and honing my surgical and clinical skills, there’s the opportunity to take away some of the fear and unknown, and this becomes a kind of answer to it.

It must be heartbreaking to see kids afflicted with these diseases. How do you cope with that part of the job?

I struggled with this during my pediatric neurosurgery rotation in residency. I talked with an attending physician, asking her how she dealt with it. She told me: “These children — our patients — are beautiful things that are in the world for a short time. And we try to take care of them when they need it.” These families have so much strength and so much grace, and these kids are so strong. I’m in awe of these kids.

I try to remember that every day is precious and that at any moment everything can change. I try to cherish what I have and be grateful. And this is important: I have to remember that I didn’t cause this illness. I can’t take on that burden. What I can do is study and work really, really hard to offer my patients and their families state-of-the-art care.

What excites you about your field and gives you hope for better clinical outcomes?

We’ve seen cutting-edge technological breakthroughs, after decades of little progress. Until recently, we didn’t understand the molecular biology of pediatric brainstem glioma because we didn’t have any tissue to study. We couldn’t biopsy them for diagnosis, because we already knew the outcome. In 2010, my lab had just two tissue samples for study, so we wrote a protocol to collect tissues at autopsy. We did molecular analysis and proved that there was valuable information in these specimens. I also analyzed spinal fluid from children with brainstem glioma.

We were learning that this tumor’s biology is vastly different from all other types of high-grade gliomas.

The crux of all this hope was research in 2012 that identified a mutation in Histone H3 — a protein that is a major regulator of gene expression. We have since found that these mutations occur in 80 percent of brainstem gliomas and up to 50 percent of other pediatric high-grade gliomas. Never before has this mutation been identified in human disease, and it is unique to this cancer. We’re learning that this mutation happens “upstream,” before other canonical pathways of cancer genesis. We usually think of cancers as being secondary to mutations in the genome itself, and that’s what people have been assuming for over 30 years with pediatric brainstem glioma. They’d been looking for specific mutations and using chemotherapies that worked for other cancers, but the drugs aren’t effective for brainstem glioma. Why? Because there’s an additional layer of complexity controlling tumor gene expression — an epigenetic regulation process. Five years ago we didn’t understand this disease in this way.

What are the implications for treatment?

In my lifetime, I strongly believe that we will be able to take a child with a brain tumor to the operating room, perform a minimally invasive procedure to obtain tumor tissue, rapidly do a molecular analysis to determine the unique biology of their tumor, and then stratify them to a treatment specific to those biological abnormalities that are present to give them the best possible chance for a cure. That is absolutely achievable in our lifetimes, and we are hard at work to make this a reality.
Federal Funding for Biomedical Research to Jump by $2 Billion

Biomedical researchers are always seeking more funding to investigate, treat and cure diseases. Thanks to a $2 billion increase in federal funding from Congress this year, that search will be much easier.

“In this year’s federal budget, we had one of the most significant commitments to medical research we have seen in recent times,” says US Sen. Dick Durbin (D-Illinois).

In total, the National Institutes of Health (NIH) will receive $32.08 billion nationally — a 6.64 percent increase over last year — from the omnibus appropriations bill for fiscal year 2016. In 2015, Illinois received $710 million in NIH funding, supporting 14,000 jobs and creating more than $2 billion in economic activity.

“The United States has always been the destination for scientists across the world, but we’ve seen over the past few years a reverse brain drain where many of our best young researchers and seasoned researchers have, in fact, moved their laboratories to Europe and to Asia,” says Milan Mrksich, biomedical engineering. “This represents a real turning point in where we’re going and where we can go.”

Of the $710 million of Illinois’ NIH funding last year, Northwestern received $293 million to fund the University’s research, ranging from cancer to Alzheimer’s disease.

Read more.

At noon on February 10, Crounse is co-presenting an Innovation in Teaching workshop with Dan Gruber, integrated marketing communications. Lunch will be provided.

The lunchtime session offers an exploration of The Garage while providing an opportunity for faculty and staff to interact and learn from colleagues who have used the space’s multifunctional classrooms.

“We want to encourage professors to visit and experiment with the workspace to find a setup that’s right for them,” Crounse says. “Although most of the classes taught here touch on innovation or entrepreneurship, we’re open to working with faculty in a variety of ways.”

This quarter, The Garage is hosting 12 classes across six colleges ranging from Introduction to Mechatronics to Principles of Entrepreneurship. The Garage Residency Program also boasts 185 students from 51 teams and student organizations. Although classroom facilities are open Monday through Friday from 9 a.m. to 5 p.m., student residents are provided 24/7 access to the space.

“The Garage is the perfect bridge between academic learning and entrepreneurship,” says Patrick G. Ryan Jr., a Northwestern trustee and founder and CEO of INCISENT Labs.

Students and faculty can also visit The Garage Café (coffee is free). Crounse says that the space is frequently used by faculty before or after classes to catch-up on email or advise students on their startup or entrepreneurial ideas.

Learn more or register for February’s Innovation in Teaching session.
Chemical Engineer Named Office for Research Development Director

Northwestern has appointed Nicole Moore as its director of the Office for Research Development (ORD).

Moore comes to Northwestern from the National Cancer Institute’s (NCI) Division of Cancer Biology. As program director there, she oversaw and advised the NCI grant portfolio related to mathematics, engineering, material science, and physics.

“We’re excited that Nicole has joined the Office for Research as a member of the ORD team,” says Fruma Yehiely, associate vice president for research. “Nicole brings a wealth of knowledge of NCI, National Institutes of Health, and National Science Foundation grant programs and processes as well as a multidisciplinary research background that will enhance our ability to support and promote the growth of Northwestern’s research enterprise.”

Moore earned her bachelor of science degree in biomolecular and chemical engineering at the University of Notre Dame and her doctorate in chemical engineering from Washington University in St. Louis. Prior to her tenure at NCI, she was a research chemist at the National Institute of Standards and Technology; her research there helped develop advanced technologies to identify key peptide configurations that direct cell targeting, intracellular trafficking, and differentiation. She has co-authored several research publications in the biological sciences, physical sciences, and science of team science fields.

McDade, Motter Recognized for Distinguished Contributions to Science

Thomas McDade, anthropology, and Adilson Motter, physics and astronomy, have been elected fellows of the American Association for the Advancement of Science (AAAS), the world’s largest general scientific society.

New fellows, honored for their scientifically or socially distinguished efforts to advance science or its applications, will be honored February 13 at the 2016 AAAS Annual Meeting in Washington, DC.

AAAS recognized McDade, a faculty fellow at the Institute for Policy Research, for his distinguished contributions to biological anthropology, particularly for biocultural perspectives on human development, human ecological immunity, human biology, and field and laboratory methods.

Motter was acknowledged for his distinguished contributions to the fields of complex systems and nonlinear dynamics, especially for advances in the network modeling and control of collective dynamics in complex physical and biophysical systems.

Read more.

Roe Appointed New IRB Director

The Office for Research has named Denise “Dee” Roe executive director for Northwestern’s Institutional Review Board (IRB).

Roe comes to the University from Spectrum Health, a large nonprofit healthcare provider in western Michigan, where she oversaw all policies and procedures related to human research protections and ethical research conduct. In that role, she also ensured that Spectrum’s physician-scientists met all Association for Accreditation of Human Research Protection Programs (AAHRPP) standards. In addition to her IRB-related responsibilities, Roe oversaw institutional biosafety, research laboratory safety, institutional animal care and use, and the research conflict of interest programs.

“We are excited to welcome Dee to the Office for Research and the IRB Office team,” says Ann Adams, associate vice president for research. “Dee brings an incredible breadth of academic and clinical experience that will enhance Northwestern’s program of excellence in protecting the rights and welfare of research participants and advance the partnership with Northwestern’s affiliate hospitals.”

Prior to joining Spectrum in 2010, Roe worked in various positions at Vanderbilt University, starting as a licensed practical/staff nurse in oncology in 1992. She joined Vanderbilt’s IRB office in 2001 and eventually was promoted to director and Institutional Official for Vanderbilt’s HRPP.

Roe holds a master of science in management, nursing licenses, and is a certified IRB professional and an AAHRPP site visitor.
Renowned Physicist Gerald Gabrielse to Join Northwestern

Physicist Gerald Gabrielse, a leader in super-precise measurements of fundamental particles and the study of antimatter, will join Northwestern as the Board of Trustees Professor of Physics. He also will be the founding director of the Center for Fundamental Physics at Low Energies.

Gabrielse, a past chair of the Harvard University physics department and currently the George Vasmer Leverett Professor of Physics at Harvard, is internationally renowned for his precise comparisons of matter and antimatter. Discovery of any unexpected difference between matter and antimatter would shatter the world of particle physics. His application of the techniques of atomic physics to make super-precise measurements of the electron plays an important role in particle physics; these measurements are sensitive to new physics effects beyond the reach of the Large Hadron Collider.

“Jerry is a big-picture thinker, scientist of the highest caliber, and dedicated teacher,” says Adrian Randolph, dean of the Weinberg College of Arts and Sciences. “We are thrilled to have him join our faculty. He and the Center for Fundamental Physics will ensure Northwestern is a leader in atomic, molecular, and optical physics.”

Gabrielse will join Northwestern September 1, 2017. He will build a broad research group that focuses on a variety of atomic, elementary particle and low-temperature physics experiments.

Read more.

Karl W. Eikenberry Chosen to Lead Buffett Institute for Global Studies

Northwestern has named former US ambassador to Afghanistan Karl W. Eikenberry as executive director of the recently created Buffett Institute for Global Studies.

Eikenberry retired from the Army in 2009 as a lieutenant general after serving as deputy chairman of the NATO Military Committee in Brussels and previously commanding the US-led military coalition in Afghanistan. He is currently a faculty member at Stanford University and will become executive director at the Buffett Institute on September 1.

“We are thrilled that Ambassador Eikenberry will be the inaugural leader of the Buffett Institute at such an important juncture in Northwestern’s history,” says Northwestern President Morton Schapiro. “He has played a highly visible role on the world stage with his frank and insightful ideas about some of the most critical issues of our day and will play a central role in taking the scope and impact of our global programs to an entirely new level.”

The Buffett Institute is central to the transformation of global studies underway at Northwestern, following the January 2015 announcement of a $100 million gift to the University from alumna Roberta Buffett Elliott.

“The gift has made it possible for Karl to join the Northwestern team. He has extraordinary intellectual heft and deep experience as a diplomat and military leader in China, Central and South Asia, and Europe,” says Northwestern President Emeritus Henry S. Bienen. “We are so fortunate to have Ambassador Eikenberry join us, and we have every confidence that he will make Northwestern’s ambitious plans for the new global institute a reality.”

As chair of the search committee, Bienen played a key role in finding the right person to lead the institute.

Before his arrival at Stanford, Eikenberry served from May 2009 to July 2011 as the US ambassador to Afghanistan. As chief of mission in Kabul, he led the civilian “surge” directed by President Obama to reverse insurgent momentum and set the conditions for transition to full Afghan sovereignty.

Read more.

Civil Rights Pioneer to Deliver Keynote

Legendary civil rights and peace activist Diane Nash — who became involved in the nonviolent civil rights movement in 1959 when she was a college student in Nashville — will be the keynote speaker at Northwestern’s 2016 commemoration of the life and legacy of the late civil rights leader Martin Luther King Jr.

Nash, one of the founding students of the Student Non-violent Coordinating Committee, will speak on both the Chicago (at noon) and Evanston (at 6 p.m.) campuses January 25. Both programs are free to attend.

Nash, a Chicago native, led the Fisk University student sit-in movement in Nashville, the first southern city to desegregate its lunch counters.

Read more.
CMIDD Announces 2015 Silverman Research Award Winners

The Center for Molecular Innovation and Drug Discovery (CMIDD) has announced its 2015 Silverman Research Award recipients. The one-year grants, made possible by the generous support of Richard Silverman, chemistry, enable Northwestern investigators to obtain preliminary results for early drug development.

**THIS YEAR’S Awardees Are:**

- **Robert Lamb**, molecular biosciences. Lamb will pursue a novel strategy to develop therapeutics for treating respiratory syncytial virus (RSV), a potentially deadly virus in infants that can cause lung failure, pneumonia, and bronchitis. Currently, no approved vaccine for RSV exists and treatments are limited. With these funds, Lamb will work with CMIDD members Gary Schiltz and Rama Mishra to produce a compound for treating RSV.

- **Teepu Siddique**, neurology and cell and molecular biology. Siddique’s previous work with CMIDD led to the discovery of two compounds that inhibit the expression of a mutant protein (SOD1) linked to familial amyotrophic lateral sclerosis (ALS). To learn more about how these inhibitors work, Siddique and Thomas Lukas, pharmacology, will collaborate with Schiltz to develop these compounds into chemical probes to identify their molecular target. This research will help elucidate the mechanism of action and uncover new biological targets that may lead to the further development of more efficacious and less toxic ALS therapeutics.

- **Alfred George**, pharmacology, and **Milan Mrksich**, biomedical engineering. George and Mrksich seek to optimize an in vitro analytical method to study the functional consequences of several dozen human genetic variants in a drug metabolizing enzyme. The award will support the synthesis of 12 new chemical probes for use in assays of this human enzyme activity. The research will have a significant impact in pharmacogenomics and will increase our understanding of how different individuals respond to medicines.

MacArthur Fellow to Join Northwestern

MacArthur Fellow and organic chemist William R. Dichtel will join Northwestern as a professor of chemistry this summer.

Dichtel is a rising star working in new materials at the nanoscale. His pioneering work developing porous polymers known as covalent organic frameworks (COFs) has applications to water purification, batteries, and other energy storage.

His innovations one day might lead to batteries that can charge in seconds rather than minutes or hours, materials that rapidly remove pollutants from water, and systems that can detect explosives in the air.

“In addition to his tremendous accomplishments and vision in research, Will is a committed and innovative teacher,” says Peter C. Stair, chair of Northwestern’s chemistry department. “The undergraduates will love him. He is a spectacular addition to the chemistry department and Northwestern.” Read more.

IPR Colloquium to Explore Effects of Educational Expansions

What happens when students with marginal academic records have increased access to higher education?

The multifaceted answer will be the focus of an Institute for Policy Research (IPR) presentation delivered by Nicola Bianchi, strategy and an IPR associate.

“Many governments are pushing to send more students to college, but these policies are very complex,” says Bianchi. “My research studies some potential consequences of increasing access to higher education on student learning, from school quality to its effects on peers.”

Bianchi’s findings come from his study of an Italian reform that drastically increased enrollment in college-level STEM (science, technology, engineering, and mathematics) programs in the 1960s. Tracking data for thousands of students affected by the reform, Bianchi unearthed the unintended consequences of making education more accessible.

Bianchi’s presentation is part of IPR’s Fay Lomax Cook Monday Colloquium Series and will take place from noon to 1 p.m. on January 25 at Chambers Hall, 600 Foster Street.

Learn more.
Facchetti, Marks Named to NAI

Chemists Antonio Facchetti and Tobin Marks have been named 2015 Fellows of the National Academy of Inventors (NAI).

Election to the NAI is accorded to academic inventors who have created or facilitated outstanding inventions that have made a tangible impact on the welfare of society.

Marks and Facchetti will be inducted April 15 as part of the Fifth Annual Conference of the National Academy of Inventors to be held at the US Patent and Trademark Office in Alexandria, Virginia.

Marks, chemistry and materials science and engineering, is a world leader in the fields of organometallic chemistry, chemical catalysis, materials science, organic electronics, photovoltaics and nanotechnology. He has developed processes for numerous types of recyclable, environmentally friendly plastics, efficient organic displays and transistor circuitry, and organic solar energy cells. He holds 233 US patents that have been licensed to several major corporations and is a cofounder of the printed electronics startup Polyera Corp.

Facchetti, chemistry, has made seminal contributions to the design, synthesis, and characterization of novel organic/hybrid materials, including the development of unconventional fabrication strategies and commercially viable electronic devices. He is a cofounder and chief scientific officer of Polyera Corp. and scientific advisor of Raynergy Teck.

Northwestern in San Francisco to Link Journalists, Technology Specialists

Northwestern is opening a new space in San Francisco that will further enhance the school’s leadership at the evolving fields of engineering, computer science, journalism, and integrated marketing communications.

Located in a highrise within the city’s Financial District, the 18,000-square-foot space will feature a state-of-the-art presentation area to engage with alumni and partners in the Bay Area, collaborative classrooms and a flexible design studio. It will be used for quarter-long residencies, short immersion experiences, and events for alumni and collaborators.

“The most exciting and unexpected breakthroughs happen at the intersections between disciplines,” says Julio M. Ottino, McCormick School of Engineering and Applied Science dean. “We have had a track record of success with Medill and look forward to continuing our partnership as we explore new ways that journalism, marketing, engineering, and computer science can work together.”

Northwestern’s westward expansion comes at a time of rapid change in the media and tech industries, increasing the need for collaboration between journalists and technology specialists.

In August, the University announced the opening of the West Coast regional office for alumni relations and development, a resource and meeting space for alumni, current and prospective students and their families, and other members of the University community living throughout the West Coast.

Read more.

Redesigned Northwestern Research Magazine Online

In the Fall + Winter edition of Northwestern Research Magazine (formerly CenterPiece), we highlight some of the ways that our faculty members explore memory. They do so from various angles: biological, cultural, institutional, and aesthetic. For example, we visit the medical school’s “brain bank” to learn how Cognitive Neurology and Alzheimer’s Disease Center scientists like M. Marsel Mesulam (pictured) are using cross-disciplinary collaboration and cutting-edge tools to advance breakthroughs in the battle against dementia and related disorders. Read more.
2016 Science Café Series Begins with Sleep and Health Focus

An estimated 5 million Americans head to work at a time when they should be fast asleep.

The wakefulness of night owls, new parents, and shift workers leaves them fighting a battle with their body’s natural circadian clock — the internal regulation of our day-night cycle. At the next Science Café, Northwestern scientists will shed light on the processes governing these patterns of consciousness.

“The modern world seems to be increasingly aligned against the proper expression and alignment of our circadian rhythms and sleep-wake cycles, making it all the more important to understand how those cycles work and relate to our health,” says Keith Summa, an MD/PhD student in the lab of Fred Turek, director of Northwestern’s Center for Sleep and Circadian Biology. “The pace at which we are learning new things about the body clock and its relationship to health and disease is quite rapid, making today an incredibly exciting time to explore these fields.”

Summa and Turek will discuss their investigations and provide an introductory overview of circadian rhythms and sleep at Northwestern’s next Science Café, taking place on January 20 from 6:30 to 8 p.m. at the Firehouse Grill in Evanston.

Science Café provides a forum for members of the University and the public to engage in discussion with Northwestern researchers on important scientific issues. The monthly talks are free. Learn more.

New Grant Extends Northwestern University Press Impact

Northwestern University Press has received a three-year, $73,000 grant from The Andrew W. Mellon Foundation to digitize important but out-of-print titles. The grant also will help underscore the importance of open access research studies in the humanities, giving a new generation of readers unprecedented access to this work.

The grant is one of the first of the new Humanities Open Book program, jointly sponsored by Mellon and the National Endowment for the Humanities.

Northwestern University Press will use the funding to create free electronic versions of 64 outstanding humanities titles in African studies, literary criticism, and philosophy.

“This is an ideal project to extend our collaboration on campus and nationally,” says Sarah Pritchard, dean of Northwestern University Libraries. “The Press has such a strong backlist in the humanities, and the libraries have an increasingly robust digital repository infrastructure, so we are pleased to be able to bring both together.”

Read more.

Single-Chip Laser Delivers Powerful Result

From their use in telecommunication to detecting hazardous chemicals, lasers play a major role in everyday life. They keep us connected, keep us safe, and allow us to explore the dark corners of the universe.

Now a Northwestern team has made this important tool even simpler and more versatile by integrating a mid-infrared tunable laser with an on-chip amplifier. This breakthrough allows adjustable wavelength output, modulators, and amplifiers to be held inside a single package.

With this architecture, the laser has demonstrated an order-of-magnitude more output power than its predecessors, and the tuning range has been enhanced by more than a factor of two.

“We have always been leaders in high-power and high-efficiency lasers,” says Manijeh Razeghi, electrical engineering and computer science, who led the study. “Combining an electrically tunable wavelength with high power output was the next logical extension.”

The new discovery builds on Razeghi’s many years of research with Northwestern’s Center for Quantum Devices. In 2012, she developed a widely tunable, single chip, mid-infrared laser.

Read more.
Honors

National Public Radio named *Playlist for the Dead*, a novel by Michelle Falkoff, law, one of the year’s best for 2015.

Institute for Policy Research economist Jonathan Guryan has been named co-chair of the Abdul Latif Jameel Poverty Action Lab’s State and Local Innovation Initiative. The initiative encourages randomized evaluations on many issues, such as crime, education, health, and housing.

Todd Murphey, mechanical engineering, has received Northwestern’s Cole-Higgins Award for Excellence in Teaching. Murphey, whose research focuses on computational methods in dynamics and control, was lauded for his enthusiastic teaching approaches and emphasis on student learning.

Madhu Reddy, communication studies, has been elected a fellow of the American College of Medical Informatics for his significant contributions to the field of Informatics.

Laurie Shannon, English, has won the Elizabeth Dietz Memorial Award for her 2013 book *The Accommodated Animal: Cosmopolity in Shakespearean Locales*. The award recognizes the best recent book in either English Renaissance studies or Tudor and Stuart drama.

Igal Szleifer, biomedical engineering, has received Northwestern’s Cole-Higgins Award for Excellence in Advising. Szleifer, who researches the fundamental properties of complex molecular systems, earned this recognition for encouraging his students to reflect on their long-term goals and for fostering learning and creativity.

Krista Thompson, art history, has been awarded the Charles Rufus Morey Book Award for 2016 by the College Art Association — one of the singular prizes in art history — for her book *Shine: The Visual Economy of Light in African Diasporic Aesthetic Practice*.

Discoveries

A new study led by Navdeep Chandel, medicine: pulmonary and cell and molecular biology, challenges the common understanding that energy production is mitochondria’s most important function. The research deciphers the organelles’ other responsibilities. Read more.

Gianluca Cusatis and Roman Wendner, both civil and environmental engineering, are exploring how to create inexpensive yet strong concrete out of “Martian” soil. Read more.

Northwestern neuroscientists led by Marco Gallio now can read the mind of a fly. The researchers developed a clever new tool that reveals interactions between neurons during a behavior or sensory experience, such as smelling a banana. Mapping the pattern of individual neural connections could provide insights into computational processes that underlie the human brain’s functioning. Read more.

Mark Hersam, materials science and engineering, and graduate student Andrew Mannix were among a team of scientists from Northwestern, the US Department of Energy’s Argonne National Laboratory, and Stony Brook University that created a two-dimensional sheet of boron — a material known as borophene. Scientists have been interested in two-dimensional materials for their unique characteristics, particularly involving their electronic properties. Borophene is an unusual material because it shows many metallic properties at the nanoscale even though three-dimensional boron is nonmetallic and semiconducting. Read more.

Nina Kraus, communication sciences and disorders, shed light on one of the brain’s most complex tasks — making sense of sound — during the recent Falling Walls conference in Berlin. During her 15-minute presentation, Kraus explained how she solved a major problem in the field by devising a new way to measure auditory cognition. Read more.

Multiple sclerosis (MS) may be triggered by the death of brain cells that produce the insulation around nerve fibers. This surprising new view of the disease is reported in a study from Stephen Miller, microbiology-immunology, and researchers at University of Chicago. The team also found that a specially developed nanoparticle prevented MS even after the death of those brain cells. Read more.

A brain region that controls human emotion and addiction is remodeled by chronic pain, reports a new study by D. James Surmeier, physiology. Read more.

The laboratory of Derek Wainwright, neurological surgery, is studying strategies to reverse pathways that inhibit the immune system from fighting glioblastoma, a fatal and incurable type of brain cancer. In a recent review published in *Clinical Cancer Research*, Wainwright discussed how a specific enzyme could play a critical role in future immunotherapies that target glioblastoma. Read more.
**Spotlight: Research in the News**

Following US Supreme Court Justice Antonin Scalia’s suggestion that African Americans might benefit from attending “slower-track” schools, *The Guardian* quoted Anthony Chen, sociology, who says there’s “little credible evidence” to support this “mismatch theory.”

“The Today Show” recently featured sleep researcher Kelly Glazer Baron, neurology.

Jay Gottfried, neurology, was quoted in *New York Times* regarding his research on smell and memory. The sense of smell, he says, is our most ancient, primal sense and has “intimate and direct control over emotional and behavioral states.”

The Economist cited Jonathan Guryan, human development and social policy, and his finding that fathers with a job and a college degree spend more than double the time with their kids than do less-educated dads.

Nancy Loeb, law, wrote an article for *TIME* about the toxic water situation in Flint, Michigan.

Dylan Minor, managerial economics and decision sciences, was quoted in *Financial Times* about how managers can reduce the risk of recruiting toxic workers. He advises using psychological tests to detect how self-regarding a candidate is, to look for any philanthropic work they have done, and to phone their references to learn how much they contributed to the team.

The research of Benjamin Page, political science, was extensively cited in a front-page *New York Times* story. Page’s research shows that billionaires tend to have economically conservative views that carry disproportionate weight in the political process, although their preferences differ widely from the public on issues ranging from raising the minimum wage to social welfare programs.

Washington Post featured Jennifer Richeson, psychology, and postdoctoral fellow Maureen Craig, exploring their experiment in which participants read about the fact that white residents are no longer the majority of California’s population. White participants reading the information were more likely to support the Republican Party and more likely to endorse conservative views in a questionnaire.

In a *Washington Post* editorial, Rachel Beatty Riedl, political science, and her co-author outlined the rise of Pentecostal and charismatic churches in Africa and their implications for poverty.

Time, Huffington Post, Yahoo, and other international publications featured Jonathan Silverberg, dermatology, for his research that found that children who suffered from asthma, eczema, or hay fever — the most common allergic reactions among youngsters — showed higher rates of obesity, hypertension, and high cholesterol compared to children without allergies.

US News and World Report and other national publications quoted James Surmeier, physiology, on promising clinical trials involving a drug that may ease the side effects of a popular Parkinson’s disease drug.

Sandra Waxman, psychology, wrote an article for Huffington Post about the relationship between disparities in access to high-quality childcare and a cascade of deleterious consequences that serve as barriers to early learning opportunities.

New York Times wrote about Michael Wolf, medicine, and his discovery that medication adherence, a widespread public health concern, is a particular problem for older people.

Teresa Woodruff, obstetrics and gynecology, was quoted in a *Chicago Tribune* article about the importance of using male and female subjects in basic science research.

**Luce Grant Will Advance Research on Religion, Politics**

Elizabeth Shakman Hurd, political science is about to enter uncharted territory, coleading scholarly inquiry into the emerging and innovative study of US diplomatic history, American religion, and legal and international studies.

Hurd and collaborator Winnifred Fallers Sullivan at Indiana University-Bloomington have been awarded a three-year, $390,000 grant from the Luce Foundation to better understand the complex and symbiotic relationship between US domestic and foreign policy as it relates to religion and religious governance.

Read more.
Proposal and Award Report: Through November 2015

The total amount of award funding that Northwestern received this fiscal year, through November, is $77.8 million, an 8 percent decrease ($7.2 million) compared with November 2014. The number of awards to date (482) is a 4 percent decrease compared to last year.

The dollar volume of awards from federal agencies increased 7 percent ($3.9 million). Awards from industrial sponsors are down about 43 percent ($8.2 million). Foundation funding is down 36 percent ($2.5 million), while voluntary health organization funding is down 13 percent ($0.4 million).

The dollar volume of proposals submitted through November is $741.5 million, a decrease of 1 percent compared to last year. The number of proposals submitted (907) is down 7 percent.

The dollar volume of proposals submitted to federal agencies rose 2 percent ($16.5 million), while proposals to industrial sponsors was down 42 percent ($8.5 million). Proposal activity to voluntary health organizations is down 21 percent ($3.7 million) and foundation proposals are down 32 percent ($6.7 million).

Click [here](#) to access the full report.

From the junctions that hold cells together to the bacteria that cause pneumonia, fascinating scientific images provide a window into the wide range of research at Northwestern. This image shows infected neural cells (brown) in a model of herpes simplex virus encephalitis. It was selected as one the top scientific images of 2015 by the Feinberg School of Medicine. See more.