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# Science + Discovery

Issue 2  
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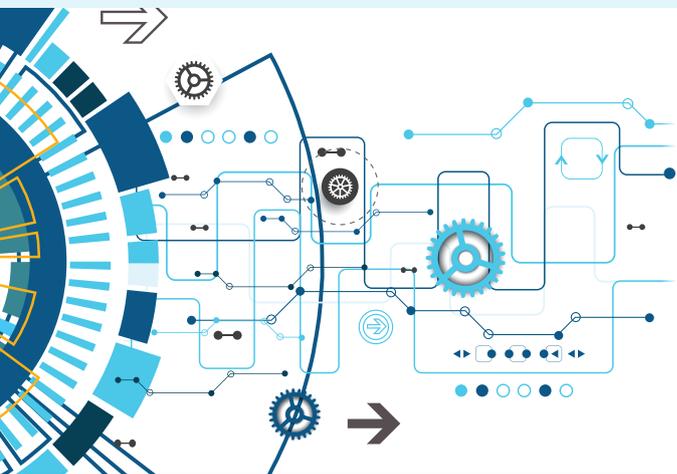
**Feinstein Institute  
for Medical Research**  
Northwell Health®

**Welcome to the** Summer/Fall 2017 edition of *Science + Discovery*, a publication celebrating the pioneering work of the Feinstein Institute for Medical Research.

In these pages, we invite you to examine recent developments taking place at the Feinstein Institute, including new applications for existing medications, greater understanding

of the way your genes can be used to combat various conditions including cancer and advances in the field of bioelectronic medicine with the potential to affect the lives of millions.

Join us on our journey to push the boundaries of medical discovery and learn more about how your support makes progress possible.



## Researchers join innovators at top tech conference

In one of this year's most popular panels at the SXSW Interactive Festival, America's premier festival of technological and scientific innovation, Feinstein Institute researchers discussed the current clinical trials and future applications in the emerging field of bioelectronic medicine with colleagues from other leading research institutions.

Chad Bouton, director of the Center for Bioelectronic Medicine and vice president of advanced engineering at Northwell Health, had an open dialogue with thought leaders from the Massachusetts Institute of Technology and the Defense Advanced Research Projects Agency as part of the panel, "The Future Body: Modulating the Nervous System."

"The SXSW Interactive Festival is rightly celebrated as one of the best venues for showcasing innovation in a wide array of fields and disciplines, including health care," Mr. Bouton said. "We believe few breakthroughs have greater capacity to have an impact on millions of lives than the research being conducted in the field of bioelectronic medicine."

Visit [4healthier.me/NWSD-SXSW](http://4healthier.me/NWSD-SXSW) to watch the panel.

## GE and United Therapeutics — our partners in bioelectronic medicine

Two new alliances have the potential to transform the way injuries and diseases are treated.

**The Center for Bioelectronic Medicine** has entered into strategic partnerships with GE Ventures and United Therapeutics (UT) to further strengthen and support the development of bioelectronic medicine therapies.

The venture capital branch of General Electric, GE Ventures partners with organizations around the world that are making strides in industries, including health care. The GE Ventures-Feinstein Institute alliance brings together Feinstein Institute researchers and GE Global Research Center scientists to develop new therapies for a range of illnesses, including cancer, diabetes and neurodegenerative disorders.

"GE's collaboration with the Feinstein Institute brings critical mass to our efforts in terms of resources, know-how and partnerships," said Chad Bouton, director of the Center for Bioelectronic Medicine and vice president of advanced engineering at Northwell Health. "In just a few years, we will look back on this agreement as the moment when bioelectronic medicine took off."

### Expanding bioelectronic medicine targets

Through a collaboration with United Therapeutics, Feinstein Institute researchers will receive funding for four new clinical research endeavors, two of which will be conducted by the Center for Bioelectronic Medicine. These projects will focus on integrating bioelectronic medicine and cell therapy into such fields as cardiology and post-transplant care.

"Collaboration is an indispensable factor in successful medical research," said Kevin J. Tracey, MD, president and CEO of the Feinstein Institute. "With great partners, you can accomplish great things for science and for patients. United Therapeutics is such a partner."

# Alzheimer's disease and assisted living — unlocking the key to a better life



An exciting new partnership between the Litwin-Zucker Center for Alzheimer's Disease and Memory Disorders and The Bristol Assisted Living could enhance quality of life and cognition for assisted living residents with dementia.

**Over the past** decade, assisted living residences such as those managed by The Bristol Assisted Living have become a popular housing option for elderly individuals who need increased help with daily tasks. While transitioning to an assisted living facility can be difficult for all residents, it can be particularly challenging for those with dementia, who find the lack of familiar surroundings especially stressful.

Now, researchers are working with residents of The Bristol Assisted Living on an exciting new project. They hope to learn how to ease this transition and keep residents with dementia in the home-like setting of assisted living longer, which is preferred over more institutionalized living arrangements.

## Positioned for progress

As part of this new relationship, a dedicated 1,100-square-foot clinical space was created at The Bristol at Lake Success. This residence is

specifically designed to identify and supplement the needs of residents with memory disorders.

"We plan to investigate whether demographic, health and cognitive factors as well as physical, social and mental activities affect the length of time a resident is able to remain in assisted living without transferring to a higher level of care," said Peter Davies, PhD, director of the Litwin-Zucker Center for Alzheimer's Disease and Memory Disorders. "The best way to do that is to work with residents in the assisted living environment. We are developing weight training and dance therapies, which will help maintain the mental health of residents and also have a positive impact on their physical health and mobility — additional elements which help to improve quality of life."

Residents who agree to participate in these programs go through cognitive testing before beginning

"There has been little research examining how to help individuals diagnosed with dementia thrive in an assisted living facility. We're happy that The Bristol Assisted Living has created a space for us to explore new and innovative ways to better the care of patients with Alzheimer's disease and dementia."

— Peter Davies, PhD, director of the Litwin-Zucker Center for Alzheimer's Disease and Memory Disorders

participation and at regular intervals thereafter. They aim to find out which programs best help residents improve or at least maintain their abilities. Engagement in mental and physical activities, as well as socialization, are thought to maximize retention of function and quality of life.

Banking on  
genetics'  
potential  
to unlock

# personalized therapies

Using the Northwell Health Biobank — one of the New York metropolitan area's largest — Feinstein Institute researchers explore the ways individuals' biological makeups impact their care. Treating cancer and other conditions based on patients' unique genetic characteristics could change everything.

**The Northwell Health** Biobank stores blood and tissue samples obtained from patients representing the most diverse population in the United States. The wealth of genetic information housed in the biorepository allows researchers at the Feinstin Institute and other partner institutions, including Cold Spring Harbor Laboratory (CSHL), to investigate and design novel, individualized protocols to predict, prevent and treat disease.

“With the biobank, we are aiming not only to advance research and discovery, but to establish new standards of care for patients,” said James M. Crawford, MD, PhD, executive director and senior vice president of laboratory services for Northwell Health. “The system we have established with the biobank can be seen as a circle. Northwell Health provides patient care and obtains tissue or blood that can be used for research. Samples give researchers vital insight into human biology. We then bring the discoveries made at the Feinstein Institute and at partners such as CSHL back to our patients for first-in-human clinical trials and therapy.”

### A research resource for numerous conditions

The applications of this bedside-to-bench-to-bedside method increase all the time, as researchers use the repository and the investigatory pathways it has opened to explore the genetic underpinnings of cancer.

In the GREAT Kids (Genomics for Risk Evaluation and Anti-cancer Therapy in Kids) study, Feinstein Institute researcher Kenan Onel, MD, looks for markers in the genes of pediatric cancer patients and their families that could signal genetic predisposition to the disease and be used to help prevent cancer from developing in others. Dr. Onel plans to extend this research into exploring how genetics and environmental factors influence the development of other diseases with the LIFE (Long Island Family Empowerment) Project, which will follow 20,000 Northwell Health pediatric patients and their parents for life.

Earlier this year, Northwell Health took its cancer biobanking efforts to new heights with the creation of a dedicated oncologic biorepository created with support from Indivumed, a German company specializing in personalized anti-cancer agents. A complement to the health system’s existing collection of patient samples, the new biobank will house cancer tissues from a variety of hospital sites and allow Northwell Health patients to take part in advanced research and receive standard curative therapy concurrently, according to Dr. Crawford.

“Our expanded ability to obtain human tissue for translational research promotes a better understanding of the interaction between cell biology and response to therapy,” said Peter K. Gregersen, MD, founder of the Northwell Health Biobank and head of the Robert S. Boas Center for Genomics and Human Genetics at the Feinstein Institute. “That is an essential factor in developing targeted therapies.”

### A living biobank

Biobanking has the potential to help researchers develop individualized therapies for a host of non-oncologic diseases, and Dr. Gregersen explores that promise through the biobank and a nontraditional program called the Genotype and Phenotype (GaP) registry. During the past decade, more than 7,000 GaP volunteers have formed a “living biobank” of research subjects who agree to participate in certain studies — more than 80 to date — based on their genetic composition.

One such study focuses on a female reproductive disorder that is notoriously difficult to diagnose: endometriosis. Using the GaP registry, Dr. Gregersen and colleagues are developing a novel test that may allow clinicians to identify the disease early and eliminate the need for diagnostic laparoscopy and therapeutic surgery. GaP is poised to grow, with plans in the works to expand the registry to 50,000 volunteers so researchers around the globe can tap this unique biobank for a range of projects.

Learn more about the Feinstein Institute’s genetics and genomics research at [4healthier.me/NWSD-genetics](https://4healthier.me/NWSD-genetics).

## Genetics at the bedside

DNA blood screening will become part of the diagnostic process for all patients at Northwell Health. Using a DNA “chip” called the Global Screening Array (GSA), clinicians expedite diagnoses by screening patients for disease indicators expressed in their genes. The results help tailor treatments to each patient. Patients can also volunteer for their samples to be part of the biobank and used in future research studies.

“Northwell Health is one of the first health organizations to incorporate a GSA into its standard diagnostic protocols,” said Peter K. Gregersen, MD, head of the Robert S. Boas Center for Genomics and Human Genetics at the Feinstein Institute. “This cutting-edge technology helps accelerate diagnosis and identify effective treatment while also providing data to help researchers develop the next generation of targeted therapies.”

# Cardiac arrest biomarker could impact patient recovery

A new discovery by researchers may improve diagnoses and treatment for cardiac arrest (CA) patients.

**Often, CA patients** are not discovered and resuscitated until well after the cardiac incident has taken place, making it difficult for physicians to specify proper treatment and expectations for patients and their families. Determining how long the patient's brain and other organs have been deprived of oxygen is key to a patient's diagnosis and outlook, and helps guide physicians to the most appropriate treatment course.

While there are existing biomarkers physicians can test for CA, many of these cannot be detected until hours after the patient has been resuscitated. Even then, accuracy is questionable and results can take days to analyze. The levels of certain biomarkers can max out early during the oxygen deprivation process, limiting their utility in determining exactly how long the patient's body has gone without oxygen.

## An untapped resource

Investigator Junhwan Kim, PhD, set out to find a new biomarker that could tell clinicians how long oxygen flow was stopped as soon as patients wake up. His

team discovered a promising candidate in a type of lipid that breaks down during CA, causing the amount of this particular lipid in patients' blood to rise. Dr. Kim and his team studied the change in lipid levels after CA. Their findings showed that the level of a certain lipid — lysophosphatidylinositol — increased for up to 60 minutes after CA and may serve as a much better indicator of how long patients were oxygen-deprived than previous biomarkers.

**“Junhwan Kim and his team are close to determining ways to better administer treatment following cardiac arrest. This has the potential to improve the lives of the nearly 300,000 Americans who suffer a cardiac arrest each year.”**

— Kevin J. Tracey, MD, president and CEO of the Feinstein Institute

## Moving forward

Dr. Kim and his team continue to study this new lipid biomarker, and additional clinical trials are in the works. Their results could change the way doctors approach treatment and survival for CA patients.

“Having a method to detect the onset of cardiac arrest and the length of oxygen deprivation will help physicians make more informed decisions regarding treatment,” said Dr. Kim. “Patients and their families also benefit as

doctors will be able to more immediately assess the severity of the patient's injuries and have more definitive indicators of survival.”

# What's old is **new** again

Feinstein Institute researchers have discovered that an established HIV medication could be repurposed to treat lupus.

**Medical advancements can** sometimes come from looking at currently approved therapies in a new light. It is this process that led investigators Betty Diamond, MD, leading rheumatologist and researcher, and Yousef Al-Abed, PhD, a molecular chemist, in their search for a better treatment for systemic lupus erythematosus (lupus). They've discovered an HIV medication that could be used to treat and prevent organ damage.

**“Further study is required to test the effectiveness and safety of these therapies, but we believe that targeting anti-DNA antibodies is a novel approach in the treatment of lupus.”**

— Yousef Al-Abed, PhD, professor and head of the Feinstein Institute Center for Molecular Innovation

Lupus is an autoimmune disease that causes the immune system to lose the ability to differentiate between foreign agents and healthy tissue. It becomes hyperactive and attacks healthy tissue, causing inflammation, swelling, and damage to joints, skin, and internal organs. Current therapies for lupus include immune-suppressing drugs that decrease disease flare ups and organ damage. However, this treatment comes with such side effects as increased risk of infection.



## Fast-tracked progress

In their study, Drs. Diamond and Al-Abed examined therapies for other conditions that could be used to specifically target the molecular mechanisms of lupus that cause organ damage. Identifying a medication that already has FDA approval to treat another condition can help condense the time frame from discovering the drug's effectiveness on a new condition to its actual use in patients, though additional research is needed before it is approved for patients with lupus.

“We know that one of the causes of organ damage in patients with lupus is a protein that is part of the immune system called anti-DNA autoantibodies,” Dr. Diamond said. “It is our belief that an effective treatment would prevent these anti-DNA autoantibodies from attacking healthy tissue.”

This study, published in *Journal of Medicinal Chemistry*, outlines Drs. Diamond and Al-Abed's identification of a select group of HIV medications currently on the market that stop or slow the function of anti-DNA autoantibodies. Their teams reviewed the molecular mechanisms of these medications to find which would help prevent the specific way anti-DNA autoantibodies interact in patients with lupus. Through this work they identified a compound called FISLE-412, shown to decrease binding of anti-DNA antibodies in several experimental models, which in turn reduced organ damage, including in the brain and kidney — both critical to normal bodily function.

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LIJ Valley Stream · North Shore University Hospital · Northern Westchester · Peconic Bay Medical Center  
PHELPS Memorial Hospital Center · Plainview · South Oaks · Southside · Staten Island University Hospital · Syosset · Zucker Hillside  
Affiliates: Boca Raton Regional Hospital · Crouse Hospital · Maimonides Medical Center · Nassau University Medical Center

## When modest donations have **major impact**

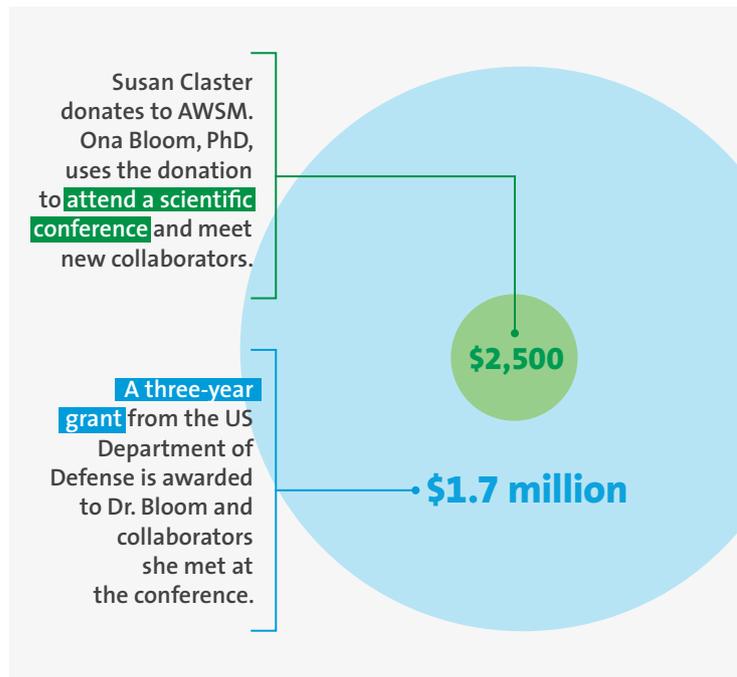
Upon hearing about the mission of Advancing Women in Science and Medicine (AWSM), Long Island resident Susan Cluster decided to donate \$2,500 to the group.

**Ms. Cluster's gift** funded travel so that a Feinstein Institute scientist could attend the American Spinal Injury Association's scientific conference. While at the conference, Ona Bloom, PhD, met researchers in her field from other institutions with whom she would later collaborate to further her work.

"At conferences, scientists learn about leading-edge research and make important professional connections that advance our fields," Dr. Bloom said.

Dr. Bloom and her new collaborators designed a joint spinal cord injury research project and applied for a grant, which resulted in nearly \$1.7 million of funding from the US Department of Defense.

"I am amazed that donating \$2,500 led to \$1.7 million in research support," Ms. Cluster said. "It's rare to find an opportunity where your donation grows so exponentially, and I feel so fulfilled due to my confidence that Dr. Bloom's research will benefit millions of patients who are debilitated by spinal cord injury."



To support the work of leading-edge researchers or AWSM, contact Robin Ross at 516-321-6237 or [RRoss2@northwell.edu](mailto:RRoss2@northwell.edu). For more information about AWSM, visit [4healthier.me/NWSD-AWSM](http://4healthier.me/NWSD-AWSM).