Dermatology Research Continues to Raise Department’s Profile

While Spiro Getsios, PhD, assistant professor of dermatology and cell and molecular biology, is learning how normal skin cells communicate, he is also mastering the art of collaboration as head of the Keratinocyte Core within the Northwestern University Skin Disease Research Center (NU-SDRC).

Comprised of three service cores – keratinocyte, pathology, and DNA/RNA delivery – the NU-SDRC supports more than 60 epithelial cell biologists and skin-focused clinical researchers from 12 different departments on the medical school and Evanston campuses.

“Since its inception in 2009, the center has opened many new avenues of research with regard to skin cells,” said Amy S. Paller, MS, MD, Walter J. Hamlin Professor, chair of dermatology, and director of the NU-SDRC. “It has allowed us to collaborate with investigators in 11 departments outside of dermatology and to encourage researchers to apply their research to skin.”

A recent Proceedings of the National Academy of Sciences article supports that assertion. The work by Paller and Chad Mirkin, PhD, professor of chemistry and director of the International Institute for Nanotechnology, described how nanotechnology could be used to deliver gene suppression through the skin.

Rising to number seven in National Institutes of Health funding in 2012, the department also features a strong Clinical and Outcomes Research unit and accessible banks of tissue and cultured cells.
The resources at hand mean a simple biopsy of diseased skin from a patient can provide cultured cells that are then grown as three-dimensional skin “raft cultures.” Named for the way they float to create an air-liquid interface, these 3D cultures can simulate a skin disorder and provide a model for examining the mechanism of disease and testing new therapeutic approaches.

“All of the basic biology research we are doing is very exciting,” said Robert Lavker, PhD, co-director of the NU-SDRC and director of research for dermatology. “We have researchers like Sergey Troyanovsky, PhD, looking at the way cadherins are important proteins for mediating cell-cell adhesion, and Xiao-qi Wang, MD, PhD, who is evaluating biomarkers that drive cutaneous melanoma. Despite the fact that we have discrete areas of focus, there exists tremendous potential for collaboration.”

Adding Dimension to Cell-Cell Communication
Using 3D skin models, Getsios is exploring how epithelial cells converse with one another.

“We are really interested in how cells behave in a community; how much their neighbors and partners dictate their behavior,” Getsios said. “We use the skin as a model system because this stratified epithelial layer has this remarkable compartmentalization in cell behavior.”

Discovered in the Getsios lab, the epidermal Eph/ephrin axis, a cell-cell signaling pathway, allows skin epithelial cells to exchange information with one another. In a March *Journal of Investigative Dermatology* cover story, Getsios used the 3D human skin equivalent to model inflammation and was able to show the benefits of a potential treatment for psoriasis, a common condition that causes skin thickening and irritation.

In normal conditions, sufficient levels of the protein ephrin keep a specific receptor – EphA2 – in check to maintain skin tissue differentiation. In psoriasis, ephrin levels are reduced and EphA2 receptors are dramatically increased. The lab was able to show that a therapeutic treatment providing more ephrin can eliminate the increase in EphA2 and restore normal differentiation. If designed to penetrate the skin in a topically applied solution, the ephrin therapy could someday be used to treat inflammatory skin conditions or tumors where EphA2 levels are up-regulated.

Eliminating Steroid Side Effects
Glucocorticoids remain the most commonly used anti-inflammatory drugs in dermatology. Unfortunately, patients chronically treated with these powerful steroid hormones develop numerous side effects, including skin atrophy.

Given that reality, researchers are trying to develop novel treatment regiments or modulators of the glucocorticoid receptor (GR) that preserve the therapeutic potency of glucocorticoids while inducing fewer side effects.

“Because the molecular mechanisms of steroid-induced skin atrophy are largely unknown, we have dedicated significant effort to identify the changes underlying skin thinning,” said Irina Budunova, MD, PhD, associate professor in dermatology. “Our novel findings revealed several GR ‘signature’ genes that are identical in mouse and human skin, and indicated the role of interplay between the GR and mTOR, a master regulator of protein synthesis, cell growth, and survival.

“These findings will allow the development of molecular markers of glucocorticoid skin side effects, as well as the development of novel GR modulators,” she said. “Topical glucocorticoids, when used in combination with mTOR modulators, would then provide safer treatment regiments.”

Stem Cell Regulation
“Our lab has historically been interested in the biology of epithelial stem cells,” said Lavker. “We are now also working to understand how micro-RNAs, part of the machinery that a cell uses to silence protein synthesis, affect or regulate epithelial homeostasis as well as dissect how microRNAs regulate epithelial stem cells.

“Over the past 18 months we have found micro-RNAs that might be stem cell-preferred,” Lavker said. “We are now in the process of identifying potential target proteins of these microRNAs to hopefully understand how they might regulate stem cell behavior.”

Having already broadened scientists’ understanding of what regulates epithelial cell survival and migration, Lavker believes micro-RNA research could have a direct impact on enhancing wound repair.

Another component of his lab has researchers looking at the differences in various squamous cell carcinomas (SCC), one of the major forms of skin cancer. By looking at relatively non-aggressive versus very aggressive SCCs, with respect to the expression of microRNAs, the lab hopes to learn more about how these microRNAs affect the formation of new tissue.
Northwestern-Argonne Institute Opens New Bridges for Collaboration

Gayle Woloschak, PhD, professor in radiation oncology and radiology, has made the 25-mile journey to Argonne National Laboratory more than a hundred times. It’s a trip that today gives her access to the highest resolution X-ray microscope for biological applications in the world. A microscope she helped build.

Formalizing the longstanding history of collaboration between members of both institutions, the Northwestern-Argonne Institute for Science and Engineering was launched in 2011, and over the past six months has begun to come of age.

“The objective here is to build bridges between Argonne and Northwestern that span the whole range, from experiential learning for undergrads and positions at the laboratory for graduate students doing research, to the sharing of postdoctoral fellows and joint appointments for faculty,” says Peter Voorhees, Frank C. Engelhart Professor of Materials Science and Engineering, and co-director of the institute.

“The broad spectrum of interaction is meant to foster the collaborative nature of both institutions,” Voorhees says. “The institute provides medical school members with access to Argonne personnel focused on medical issues, and affords Argonne this interaction that they, too, desire.”

While Feinberg adds to the scientific minds at Argonne, the laboratory builds and maintains services that would be too expensive for the university to construct and operate. Access to facilities like the Life Sciences Collaborative Access Team (LS-CAT) Beamline at Argonne’s Advanced Photon Source (APS), for instance, provides state-of-the-art resources for those researchers with a need to determine the structure of proteins or other macromolecules.

“We currently have a lot of interaction with Argonne investigators, have two large collaborative projects, and manage beamlines at the Advanced Photon Source,” says Wayne Anderson, PhD, professor in molecular pharmacology and biological chemistry. “I anticipate even more opportunities to come together in the future.”

Using high-brilliance X-ray beams from the APS, researchers can conduct basic and applied research in the fields of biological science, physics, innovative X-ray instrumentation, and more.

“The institute links the very best from academia with the best from the open science Department of Energy labs to create dream teams of scientists to solve key problems facing the nation,” says Pete Beckman, institute co-director and a recognized global expert in high-end computing systems from Argonne. “One of the key strengths of this relationship with Northwestern is that its top-ranked engineering school, along with its outstanding science departments, brings new talent and collaborations.”

Named co-directors of the institute last year, Voorhees and Beckman will help facilitate opportunities for experiential learning to undergraduates and co-supervision of graduate students and postdoctoral fellows between Northwestern faculty and Argonne personnel. The joint initiative also enables Argonne’s scientists and engineers to hold faculty appointments at Northwestern and will streamline access to facilities.

In addition to gaining valuable experience working with Argonne scientists, students have access to the APS, which produces the brightest high-energy X-rays for research in the Western Hemisphere, as well as the Argonne Leadership Computing Facility.

“Although I have been conducting experiments at Argonne since coming to Feinberg a decade ago, I think this institute will foster greater interaction between individuals at each institution,” Woloschak says. “It will help to make members of each establishment aware of resources at the other.”

Individuals interested in more information on the institute can contact Voorhees at: p-voorhees@northwestern.edu.
Faculty Profile: Eva Redei, PhD
Professor in Psychiatry & Behavioral Sciences and Physiology

Eva Redei, PhD, David Lawrence Stein Research Professor of Psychiatric Diseases Affecting Children and Adolescents, is a scientific adventurer.

“I knew for a long time that I wanted to do research, and I spent some time trying to figure out what I wanted to focus on before realizing that I really like complicated questions,” said Redei. “And there’s nothing more complicated than the brain.”

Living in Hungary as a neuroendocrinologist, Redei came to the United States three decades ago as a postdoctoral fellow at the University of California—Los Angeles. Once there, her research evolved into an exploration of the neurobiology and genetics of stress and ultimately resulted in her investigating the connection between stress and depression.

What are your research interests?

I am very interested why some people or animals are badly affected by stress and sometimes become depressed, while others are not affected or even thrive on it. The other main focus of our research is the mechanisms by which prenatal early environmental challenges affect neurodevelopment. To study these phenomena, we are using neurogenetic, endocrine, and behavioral neuroscience approaches. We have developed novel animal models, including one that shows depression-like behavior that mirrors many of the symptoms of major depression in humans.

Depression is one of the leading causes of disability in the world, but our knowledge of what causes it is limited—though the contribution of both genetic and environmental influences are accepted. We believe that our unique genetic animal model could aid depression research significantly.

My lab also studies fetal alcohol exposure, as it is a major cause of non-genetic neurodevelopmental deficits including social, cognitive, and psychiatric problems. About 10 to 12 percent of women who are pregnant, whether they know it or not, continue to drink. Despite all of the efforts of prevention, this is still a major public health problem that we are aiming to address from a basic science point of view.

What is the ultimate goal of your research?

One goal is to weaken the cognitive and behavioral consequences of prenatal alcohol exposure, which we are now closer to realizing in an animal model. We hope that this project will continue into the translational sphere as we remain committed to identifying mechanisms of vulnerability to fetal alcohol spectrum disorder (FASD).

Some of our other work, recently published in Translational Psychiatry, described a pilot study that identified potential blood markers for depression. This is the first blood test to diagnose major depression in adolescents, a breakthrough approach that allows an objective diagnosis by measuring the amount of a specific set of markers in a patient’s blood.

This pilot study is the beginning of this translational work and is the result of more than a decade of research using animal models of depression. We hope to continue in this direction, using a larger clinical sample. We are currently conducting an adult study and eventually we hope to develop diagnostic tests that not only reliably diagnose who is depressed and who is not, but identify different types of depression as well.

How does your research advance medical science and knowledge?

FASD, a spectrum of disabilities and deficits that are the consequences of prenatal alcohol exposure, has no reliable diagnostic tool and no treatment for those affected.

We have developed a set of biomarkers from placental tissue that could facilitate early diagnosis and treatment of children with FASD. We have also identified that thyroid hormone supplementation during pregnancy can lessen some of the harmful consequences of maternal alcohol consumption. We hope that these findings can be translated into diagnosis and potential treatment of FASD.

There also exists no objective diagnostic measure for depression, which would help the psychiatrist in developing treatment strategies. Antidepressant treatments have limited effectiveness, and there hasn’t been a new anti-depressant based on a different mechanism in four decades—and none based on the etiology of the illness. Our animal models have contributed to establishing blood-based diagnostics for clinical depression, and we are also employing them to find novel drug targets for antidepressant development.

How did you become interested in this area of research?

Hungarian scientists have always been at the forefront of neuroendocrinology research. The

Continued on pg. 5
Kiarri Kershaw, PhD, MPH, joins as assistant professor in preventive medicine. She received her doctorate degree in epidemiologic science, her Master of Public Health degree in epidemiology, and then a combination of all of the above, I remained committed to this research.

While a postdoctoral fellow at UCLA, I started to work on models of FASD. Although my approach has shifted from neuroendocrinology to genetics, epigenetics, and then a combination of all of the above, I remained committed to this research.

Similarly, my interest in depression research is long-standing: one day 23 years ago, a collaborator who was very influential in my career, William Pare, came to me at the University of Pennsylvania talking about a strain of rats that behave as though they were always stressed and depressed. So that's how my research using animal models of depression got started and continued into the development of our current unique genetic models of depression.

What are your biggest honors?

One of my biggest honors was being named the David Lawrence Stein Research Professor of Psychiatric Diseases Affecting Children and Adolescents. When the investiture took place about a decade ago, I learned that the professorship was named after the donor’s son who suffered from depression. Ms. Stein Wood gave a heart wrenching account of what happened to David and how she hoped that establishing this professorship would help others suffering from this illness.

I recently found the address I gave at the investiture. I promised her that I would work toward reducing the stigma of depression by finding the mechanisms or causes of the disease. I also promised to find biological markers that could diagnose depression so that more people could be treated. Those sentiments described the hope behind my work, and I feel I began to fulfill my promise with our recent findings.

Can you discuss your time at Feinberg?

Being at Feinberg has allowed me to truly explore novel ideas, and for that I am very grateful. I believe that the trust invested in me has borne results. It was a long process, but I was allowed to not only look at next week and next month, but to follow a path, no matter how unconventional it was. Doing science feels great, and I know that we have a lot of hard work in front of us before we can say that we have a blood diagnostic test for depression. Yes, our paper got a lot of publicity, but I would have given up all the publicity for one major donor saying “now go and do it.”

We are close to going to the clinic with our diagnostic test, and until that I am not satisfied. There are many more challenges in this field, and I am looking forward to taking them on.

Redei Q&A, continued from pg. 4

father of stress research, the Hungarian-born Hans Selye, was one of my idols. Still, my scientific journey was long; I initially wanted to pursue a career as a quantum chemist before getting degrees in chemical engineering and organic chemistry.

While a postdoctoral fellow at UCLA, I started to work on models of FASD. Although my approach has shifted from neuroendocrinology to genetics, epigenetics, and then a combination of all of the above, I remained committed to this research.

Matsuoka’s research interests are computational neuroscience and auditory neuroscience (stem cell biology). He has served as author or co-author on more than 20 papers in peer-reviewed journals.

Welcome New Faculty

Akihiro Matsuoka, MD, DMSc, PhD, joins as assistant professor in otolaryngology.

He received his Doctor of Medicine degree and Doctor of Medical Science degree from Kitasato University in Japan, where he also completed his otolaryngology residency and served as an assistant professor and attending physician in the department of otolaryngology. He received his doctorate degree in hearing science from the University of Iowa, where he also completed an NIH research fellowship in computational neurootology, then went on to complete a general surgery internship and otolaryngology residency at Indiana University, where he also completed an NIH research fellowship in stem cell biology. Most recently, he completed an otology/neurology/base skull surgery fellowship at the University of California—San Diego.

Matsuoka’s research interests are computational neuroscience and auditory neuroscience (stem cell biology). He has served as author or co-author on more than 20 papers in peer-reviewed journals.

Kiarri Kershaw, PhD, MPH, joins as assistant professor in preventive medicine.

She received her doctorate degree in epidemiologic science, her Master of Public Health degree in epidemiology, and her master’s degree in pharmaceutical studies from the University of Michigan—Ann Arbor. She completed her post-doctoral training as a cardiovascular epidemiology and prevention fellow at Northwestern University Feinberg School of Medicine in the Department of Preventive Medicine.

Kershaw’s research focuses on understanding how contextual factors lead to disparities in cardiovascular outcomes. Specifically, she is interested in understanding the pathways through which racial and ethnic residential segregation lead to disparities in various cardiovascular disease risk factors. She is also interested in better characterizing the behavioral and biological factors linking chronic exposure to psychosocial stressors to cardiovascular-related risk factors and outcomes.
NIH Grant Funds New IPSC Core Services

The Human Embryonic and Induced Pluripotent Stem Cell (iPSC) Core Facility, founded in 2009, has allowed Northwestern researchers to work with cells that have an ability to mature into any type of tissue in the human body. Now, an NIH grant awarded to Jack Kessler, MD, Ken and Ruth Davee Professor of Stem Cell Biology, will enable the Core to provide more support to investigators and fund the development of new stem cell technology.

“This grant has allowed the iPSC Core to buy new equipment so that more people can use the facility at the same time and to expand our team so that we are able to provide new services,” says Ljuba Lyass, PhD, director of the iPSC Core Facility.

Lyass had focused on distributing human embryonic and induced pluripotent stem cells from the Core’s own bank, and on culturing and growing undifferentiated stem cells for investigators. The grant will enable the Core to work with investigators in different ways.

“We are almost ready to take orders for human iPSC derivation,” she says. “We will be able to do it from cell lines or from biopsy material.”

“Induced pluripotent stem cells offer the opportunity to study human cells of any type, including those with a specific disease,” says Kessler. “In Alzheimer’s disease, which I am interested in for instance, we can take stem cells from people affected by the disease and make neurons.”

Lyass says the Core will initially use the original Yamanaka method and will, eventually, move to newer methods like Sendai virus reprogramming or synthetic modified mRNA reprogramming. The Core will continue to serve the majority of Northwestern investigators on a fee for service basis.

While the Core can ready human iPSCs for investigators, Lyass says labs currently must differentiate cells outside the Core. With the NIH grant, she is working to put protocols in place to differentiate cells for investigators.

“This grant is terrific for everyone at the medical school. It will fund the development of new technologies that will become available to others, which will lead to exciting research opportunities,” says Rex Chisholm, PhD, vice dean, scientific affairs and graduate education, Feinberg School of Medicine, and associate vice president for research, Northwestern University.

Lyass agrees. Investigators who might consider using the Core’s expanded capacity and services can reach Lyass via email at l-lyass@northwestern.edu or by phone at 312-503-1039 to discuss potential projects. Lyass will also have a table at Research Day on April 4 for interested investigators to discuss questions in person. Core tables will be located in Northwestern Memorial Hospital’s Feinberg Pavilion, in the third floor conference center near the research posters.

NIH News

On March 1, 2013, the United States government implemented a budget sequestration totaling totaling $1.2 trillion in across-the-board budget cuts over 10 years.

The Association of American Medical Colleges reports that NIH will have to cut $1.5 billion from its budget for fiscal year 2013 under the automatic sequestration cuts.

NIH has posted several documents online that provide an overview of what the cuts could mean for NIH-funded institutions and grantees:

- Operation Plan in the Event of a Sequestration
- Sequestration Letter All NIH Contractors
- Sequestration Letter to Grantees

Sally Rocky, PhD, NIH deputy director for extramural research, wrote in her blog Rock Talk, “…The Department of Health and Human Services and NIH are taking every step to mitigate the effects of these cuts, but based on our initial analysis, it is possible that your grants or cooperative agreement awards may be affected. Examples of this impact could include: not issuing continuation awards, or negotiating a reduction in the scope of your awards to meet the constraints imposed by sequestration. Additionally, plans for new grants or cooperative agreements may be rescoped, delayed, or canceled depending on the nature of the work and the availability of resources.”
Research Day Features Keynote Speaker, Mobile App

The ninth annual Lewis Landsberg Research Day, happening April 4, will feature a nationally renowned keynote speaker for its opening session, which begins at 1 p.m. in the Robert H. Lurie Medical Research Building's Hughes Auditorium.

The program will kick off with “Building a mitotic spindle,” presented by keynote speaker Ronald D. Vale, PhD, professor and vice-chair of the Department of Cellular and Molecular Pharmacology at the University of California—San Francisco (UCSF). Vale is a Howard Hughes Medical Institute investigator and was one of three scientists awarded the 2012 Albert Lasker Basic Medical Research Award; he is also a member of the National Academy of Sciences and the American Academy of Sciences.

The program will also feature the presentation of Feinberg’s Mentor of the Year Awards by the Medical Faculty Council. The award for basic science will be presented to Stephen Miller, PhD, Judy Gugenheim Research Professor of Microbiology-Immunology, and the award for clinical science will be presented to Jack Kessler, MD, Ken and Ruth Davee Professor of Stem Cell Biology, professor of neurology, and professor of molecular pharmacology and biological chemistry.

Research Day’s poster session, which has filled to capacity for 2013, will begin at 2:15 p.m. at Northwestern Memorial Hospital’s Feinberg Pavilion, in the third floor conference center ballrooms A, B, C, D, and the atrium. The poster session is an opportunity for presenters to network with colleagues and share exciting research.

Presenters can begin setting up posters in the hospital space as early as 10:00 a.m.

Poster awards will be presented at approximately 4:15 p.m. in the same space. Awards will be given in the categories of basic research, clinical science, public health and social science, and women’s health.

“Research Day grows every year, and 2103 is no exception,” says Eric Boberg, executive director for research at Feinberg. “We are thrilled to host Dr. Vale as the keynote speaker, and excited to include Mentor of the Year Award in this year’s program.”

To help attendees navigate the speakers, poster session, and locations, the Research Office will share a mobile app for all attendees to download prior to and on-site during Research Day. Download instructions will be announced via e-mail and at the registration table on Research Day.

Attendees are encouraged to use #ResearchDay on Twitter and to share event photos on Feinberg’s Facebook page.

IBNAM Funding Opportunity

To support the mission of Northwestern University’s Institute for BioNanotechnology in Medicine (IBNAM) and young researchers in the field of bioengineering, Baxter Healthcare Corporation will fund up to three postdoctoral fellows for a period of up to two years.

Applicants must be highly motivated individuals with a strong interest in medically relevant bioengineering research. Annual awards will provide $55,000 to cover salary, fringe benefits, and research-related expenses for the selected projects. Recipients must commit 100 percent of their effort to the IBNAM-Baxter research project during the award period.

One or more Northwestern University faculty members must sponsor each applicant. IBNAM is particularly interested in projects that will utilize the institute’s core facilities in the Robert H. Lurie Medical Research Center.

To learn more about eligibility and requirements, visit http://www.ibnam.northwestern.edu/research/ibnambaxter.html.
Student Profile: Angel Buchanan  
Clinical Psychology PhD Student

Where is your hometown?  
I grew up in Oakbrook, Ill.

What is your educational background?  
I attended college at Washington University in St. Louis, where I majored in psychology and Spanish. I spent two years as a research assistant in Harvard University’s Cognitive Neuroscience Lab, which is under the direction of Randy Buckner, PhD. I am currently a fourth year clinical psychology doctoral student in the Stress & Depression Laboratory (SADLAB) of Jacqueline Gollan, PhD, associate professor in psychiatry and behavioral sciences.

What are your research interests?  
I am interested in investigating the clinical and neural characteristics of women with major depressive disorder (MDD) using functional Magnetic Resonance Imaging (fMRI) during resting-state. From adolescence onwards, women are at higher risk than men of developing MDD; however, research has not focused on identifying neural factors that increase women’s vulnerability to depression.

My research focuses on using whole brain functional connectivity MRI (fc-MRI), a specific processing technique that involves identifying correlated synchrony of low-frequency fluctuations between brain regions during resting-state to identify how intrinsic functional connectivity operates as a diagnostic marker of depressive symptom severity in women.

What exciting projects are you working on?  
As a research assistant in the SADLAB, I am currently involved in a project funded by the Women’s Board Award that investigates affective regulation and attentional control in MDD across the female lifespan. Our lab utilizes clinical and neuroscience approaches to characterize major depression. I am involved in the scanning, preprocessing, and analysis of fMRI data collected in this study. Additionally, under Dr. Gollan’s supervision, I am continuing my research on functional connectivity during resting-state in women and am focusing on functional connectivity’s association with cognitive functioning in major depression.

What attracted you to the program?  
The Clinical Psychology PhD program at Feinberg offers a true balance of research and clinical training. I was particularly drawn to working with Dr. Gollan as she conducts exciting translational and clinical research that utilizes brain imaging methods to characterize psychopathology. Furthermore, my interest in severe and chronic mental illness as well as the biopsychosocial impact of trauma motivated me to apply to this program because it provides excellent training opportunities for clinical development. I have been able to develop a diverse skill set to treat individuals with chronic and severe psychopathology in order to improve mood, foster personality development, and address functional impairment.

What has been your best experience at Feinberg?  
My best experience was presenting my research at Friday Digest, a series organized by Karen Abram, PhD, associate professor in psychiatry and behavioral sciences, aimed to support the development of research ideas in the department. Presenting my work to scientists from different fields, answering challenging questions, and receiving helpful feedback for future directions greatly increased my confidence as a presenter and researcher. I also really enjoyed the collegial interaction between different labs, graduate students, and faculty members.

How would you describe the faculty at Feinberg?  
Throughout my four years at Feinberg, I have found the faculty here to be friendly, collaborative, creative, humorous, and incredibly supportive of my development as a researcher and clinician.

What do you do in your free time?  
When I have free time, I enjoy traveling, trying different foods and restaurants, dancing, watching movies, and reading.

What are your plans after graduation?  
Immediately after graduation, I would like to travel to a country I have not been to yet, perhaps Scotland, Japan, or Spain. After that, I would like to work in a multidisciplinary clinical team setting to treat individuals with chronic and severe psychopathology, continue clinical and translational research, and teach graduate courses.
Syamal Datta, MD
Professor in Medicine- Rheumatology and Microbiology-Immunology

Project title: Unconventional APC Inducing Autoimmune Th17 Cell Expansion in Lupus

Sponsor: National Institute of Allergy and Infectious Diseases

This project is based on the team’s discovery of a new type of antigen presenting cells (APC), which we call MM cells.

These novel APC are specially potent in priming and inducing expansion of a subset of T cells (Th17) that are critical for fighting pathogens, but aberrantly they can also become the disease causing T cells in several autoimmune diseases (Journal of Immunology 2012). For instance, subsets of autoimmune T helper (Th1 and Th17) cells drives lupus B cells to produce pathogenic (disease-causing) antibody complexes that damage vital organs, but the exact cause of lupus is unknown.

We characterized the new category of APC, resembling Megakaryocyte—and/or bipotent Megakaryocyte/Erythroid—progenitors of bone marrow (hence called M&M, or MM, cells), which are markedly expanded in the periphery of lupus patients and mice with lupus. These APC efficiently present nuclear autoantigens to selectively induce Th17 response without requiring Th17-polarizing culture conditions.

We found that in addition to requisite Th17 inducing cytokines, MM use novel accessory molecules for their potent Th17-inducing function that could be targeted to block autoimmunity generating process.

The studies provide understanding of the initial steps in autoimmunity pathogenesis by characterizing a novel category of APC that can break tolerance to nuclear autoantigens, and cause Th17 skewing in responses to foreign antigen as well. Measuring expansion of these cells could become a new biomarker for lupus autoimmunity. Studies on these unusual and potent APC advance our understanding and possible therapeutic manipulation of the Th17 immune response, which is critical for fighting virulent pathogens such as, bacteria like Staph. aureus or M. Tuberculosis, and fungi like Candida albicans; and aberrantly Th17 also can target self-antigens in several autoimmune diseases like rheumatoid arthritis, Crohn’s disease, diabetes, multiple sclerosis.

We are now doing further studies on the biology of MM cells in humans, in collaboration with William Miller, Professor of Chemical and Biological Engineering, McCormick School of Engineering, Evanston Campus.

Faculty Profiles Linked to Northwestern Scholars

Northwestern Scholars is a research networking tool open to the public and powered by SciVal Experts. The system profiles and connects faculty members from all disciplines across Northwestern University via SciVal, Direct, and VIVO networks. Northwestern Scholars can be found on the Web at www.scholars.northwestern.edu/default.asp.

To ensure that Feinberg School of Medicine faculty do not need to maintain two separate profiles, the University has linked the new Northwestern Scholars profiles to existing Feinberg faculty profiles.

Medical school faculty can make changes to the Northwestern Scholars profile through the Feinberg Faculty Profiles system. The two profiles will be synched on a regular basis.

Externally, Northwestern Scholars profiles have been automatically connected to Feinberg profiles for the general public.

Faculty can learn more about Northwestern Scholars by reading the FAQ developed by Northwestern University, and can contact fasis@northwestern.edu with questions.
Research in the News

Chicago Tribune February 27
Babies of obese moms show lower vitamin D levels
Jami Josefson’s research was featured.

Huffington Post February 23
The worst exercise excuses
Daniel Kirschenbaum was quoted.

Fox News February 20
Biological marker for dyslexia discovered by researchers
Nina Kraus’ research was featured.
Study was also mentioned in Time Magazine and Science Daily. Kraus’ research was also featured in Wired.

Chicago Tribune February 20
Nanoparticle could kill cancerous lymphoma cells, study says
C. Shad Thaxton’s research was featured.

Huffington Post February 18
Among Latinos, heart disease is leading cause of death
Martha Daviglus’ research was featured.

Yahoo! News February 14
Small changes you can make to be more heart healthy
Clyde Yancy was quoted.

Chicago Tribune February 13
Study of brain tumor adds up to better treatment
Kristin Swanson was quoted.

Fox News February 7
7 bedtime behaviors that will help you sleep
Phyllis Zee was quoted.

Chicago Tribune February 6
Northwestern University researchers add to arsenal in Parkinson’s fight
D. James Surmeier’s research was featured.

More headlines

High Impact Factor Research
January 2013


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

Validation and Advanced Development of Emerging Molecular Analysis Technologies for Cancer Research (R33)

More information

Sponsors: Department of Health and Human Services, National Institutes of Health, National Cancer Institute (NCI)
Submission Deadline: LOI April 20, Application May 20
Upper Amount: $900,000

Synopsis: This opportunity solicits grant applications proposing research projects on the advanced development of emerging molecular and cellular analysis technologies and technical or analytical validation in an appropriate cancer-relevant biological system. An emerging technology is defined as one that has passed the pilot developmental stage and shows promise, but has not been significantly evaluated within the context of its intended use. If successful, these technologies would accelerate research in cancer biology, treatment, diagnosis, prevention, control, epidemiology, or cancer health disparities. This opportunity solicits projects where proof-of-principle of the proposed technology or methodology has been established and supportive preliminary data are available. Projects proposed should show potential to produce a molecular analysis technology with a major impact in a broad area of cancer-relevant research.

Identification and Analysis of Causal Variants: Follow-Up on Genome-Wide Association Studies (GWAS) for Arthritis and Musculoskeletal and Skin Diseases (RO1)

More information

Sponsor: Department of Health and Human Services, National Institutes of Health, National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)
Submission Deadline: LOI April 20, Application May 20
Upper Amount: $1.4 million

Synopsis: Applications are encouraged that aim to characterize the genetic variations in human genomic regions that have been putatively associated with complex diseases relevant to the NIAMS mission. The purpose is to accelerate the discovery of causal genes and variants that influence the risk for disease, and conduct follow-up studies of particular genetic variants to gain novel insights into the functions of these variants and the mechanisms by which they may contribute to disease. Genomic regions of interest are primarily those identified by GWAS although other types of evidence may also inform the rationale for a given study. These studies are essential for the translation of initial GWAS finding into biological insights, and important for improving our understanding of the molecular mechanisms of disease that could lead to predictive, diagnostic, and therapeutic advances.

Featured Events

3.12 Lectures in the Life Sciences

“Hematopoietic stem cells (HSCs) and mature blood cells trafficking in vivo,” presented by Paul Frenette, MD, Albert Einstein College of Medicine.

Date: Tuesday, March 12, 4-5 p.m.
Location: Lurie Research Center — Hughes 303 E. Superior St. (Chicago campus)
Contact: wamuller@northwestern.edu
More information

3.13 ARCC Workshop: Community Review Processes

ARCC will host teams from the University of North Carolina and Vanderbilt University to share their models of community feedback and review. RSVP required.

Date: Wednesday, March 13, 11:30 a.m. to 4:30 p.m.
Location: Wieboldt Hall. Room 417 339 E. Chicago Avenue (Chicago campus)
Contact: arcc@northwestern.edu
More information

3.13 Ninth Annual Lewis Landsberg Research Day

Keynote presentation by Ronald J. Vale, PhD, University of California–San Francisco, “Building a mitotic spindle.” Program will include Mentor of the Year Awards.

Chicago campus’ largest annual research poster session to follow at 2:15 p.m. Poster awards will be presented starting at 4:15 p.m.

Date: Thursday, April 4, 1 to 5 p.m. (Presenters: poster setup begins at 10 a.m.)
Location: Keynote speaker and Mentor of the Year Award Presentation
Lurie Research Center — Hughes 303 E. Superior St. (Chicago campus)
Poster session and awards
Northwestern Memorial Hospital Feinberg Pavilion, Third Floor Conference Center 251 E. Huron Street (Chicago campus)
Contact: fsm-research@northwestern.edu
More information

More events
Event organizers are encouraged to submit calendar items on Plan-It Purple for consideration. Please contact the Research Office with further questions.