Icahn School of Medicine at Mount Sinai

# Dean's Quarterly

Fall 2015 – Winter 2016 www.icahn.mssm.edu

## Embracing the Future of Medicine

When the Icahn School of Medicine at Mount Sinai holds its annual Sina*Innovations* Conference this fall, the focus will be on the transformation taking place in digital medicine. Speakers from academia and industry will address advances in biomedical research and clinical practice, and provide insight into future possibilities that were unimaginable a few years ago.

Our Sina*Innovations* Conference, with its emphasis on genomics, nanotechnologies, mobile applications, and wearable devices, illustrates how the Icahn School of Medicine embraces change and enhances educational opportunities for its students. Preparing the digital doctors of tomorrow is the subject of the conference's first panel discussion.

Many other exciting initiatives are taking place this year. Through a new academic partnership with Google [X] Life Sciences (GLS), one of our MD/PhD students recently started her thesis at GLS's laboratory in Silicon Valley. Next year, we expect to send two MD/PhD students, an MD student, a resident, and a fellow to study at Google's facilities in California. And, for the first time, five Mount Sinai PhD and MD/PhD students recently conducted their summer research rotations with scientists at IBM Corp.

On our own campus, Mount Sinai's physicians and scientists are using the latest generation of supercomputing technology to develop truly personalized cancer vaccines, and to advance their knowledge of the human microbiome and the role that microbes play in health and disease.

The Mount Sinai Institute of Technology serves as our digital hub, the place where much of our exploration begins, and where the convergence of basic and clinical science, engineering, and computer science happens. Through Mount Sinai's AppLab, we have developed more than five health apps and an app platform that connects to Mount Sinai's Electronic Health Records.

HealthPROMISE, our flagship app that is funded by the National Institutes of Health, enables patients to report symptoms and quality-of-life indicators that help doctors track their health. The app is being used in a trial of 300 Mount Sinai patients with inflammatory bowel disease, and has been adopted at major U.S. medical centers.

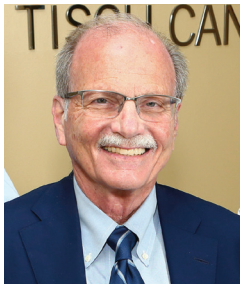

Dennis S. Charney, MD, is the Anne and Joel Ehrenkranz Dean of Icahn School of Medicine at Mount Sinai and President for Academic Affairs, the Mount Sinai Health System.

Mount Sinai has also launched a large-scale medical study of people with asthma based on Apple's new ResearchKit framework. This will be the first in a series of disease-related apps that we are planning to roll out in the future.

## The Tisch Cancer Institute Receives National Designation

The Tisch Cancer Institute at the Icahn School of Medicine at Mount Sinai has been named a National Cancer Institute (NCI)-designated Cancer Center, an honor reserved for an elite group of U.S. institutions committed to researching and treating cancer.

In conjunction with the NCI designation, The Tisch Cancer Institute received a five-year, $8.5 million grant to support research and the recruitment of top physicians and scientists. More than 50 of the nation's leading cancer researchers have joined The Tisch Cancer Institute since it was established in 2008.



Steven J. Burakoff, MD

"The NCI designation signifies excellence," says Steven J. Burakoff, MD, Director of The Tisch Cancer Institute and the Lillian and Henry M. Stratton Professor of Cancer Medicine. "Receiving this designation in New York City, which is a highly competitive market, is tangible proof of the meaningful work we are accomplishing in research and clinical care."

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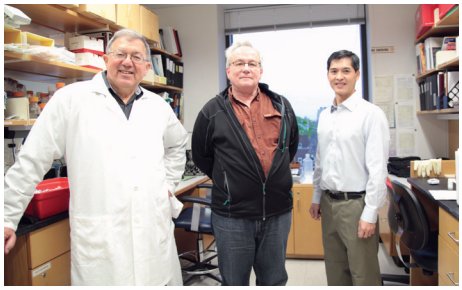
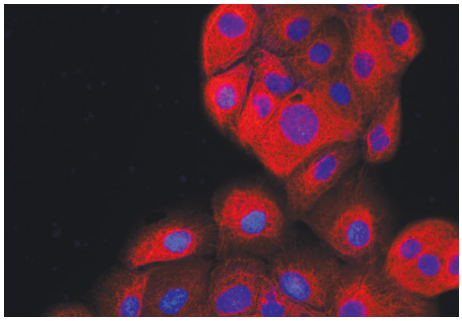
# Studying New Stem Cell Therapies for Vision Recovery

The National Eye Institute (NEI), a division of the National Institutes of Health, has awarded researchers at Icahn School of Medicine at Mount Sinai a five-year grant to support an effort to recreate a patient's ocular stem cells and restore vision in those blinded by corneal disease.

About 6 million people worldwide have been blinded by burns, trauma, infection, genetic diseases, and chronic inflammation that result in corneal stem-cell death and corneal scarring. There are currently no effective long-term treatments for the vision loss that occurs. Corneal stem-cell transplantation is an option in the short term, but availability of donor corneas is limited. Specifically, the grant will allow Mount Sinai researchers to recreate a patient's own stem cells by taking mature cells, such as eyelid or oral skin cells, and coaxing them backward along the development pathways to become eye-specific stem cells again, and serving ultimately as needed replacements for damaged cells in the cornea, explains Albert Y. Wu, MD, PhD, Assistant Professor, Ophthalmology, and the study's principal investigator.



From left, J. Mario Wolosin, PhD; Ihor Lemischka, PhD; and Albert Y. Wu, MD, PhD



Human corneal epithelial cells expressing stem cell (red) and nuclear (blue) markers. These cells can be used for transplantation in patients.

"Because the stem cells are their own, patients will not require immunosuppressive drugs that are currently used after donor corneal transplants," adds Dr. Wu, who is also Director of the Ophthalmic Plastic and Reconstructive Surgery, Stem Cell and Regenerative Medicine Laboratory and a member of The Black Family Stem Cell Institute at Icahn School of Medicine. "This would greatly improve their quality of life."

The investigators will research the most viable stem cell sources, explore the molecular pathways involved in ocular and orbital development, and develop cutting-edge biomaterials to engraft a patient's own stem cells and restore vision.

Ihor Lemischka, PhD, Lillian and Henry M. Stratton Professorial Chair of Gene and Cell Medicine, and Director, The Black Family Stem Cell Institute; and J. Mario Wolosin, PhD, Professor of Ophthalmology, are co-investigators with Dr. Wu.

The Institute is Mount Sinai's hub for both basic and disease-oriented research on embryonic and adult stem cells. Investigators believe that understanding how stem cells signal one another and other cells may potentially yield diagnostic and therapeutic breakthroughs not only for corneal damage, but possibly type 1 diabetes, Parkinson's disease, various cardiovascular diseases, liver disease, and cancer.

# Researchers Identify Key Protein in Melanoma Growth

A protein that promotes abnormal growth in melanoma cells has been identified for the first time by a team of researchers led by Emily Bernstein, PhD, Associate Professor of Oncological Sciences, and Dermatology, at the Icahn School of Medicine at Mount Sinai.

The novel discovery that the H2A.Z.2 protein is highly expressed in melanoma, appears to turn on the cell cycle, and makes melanoma cells grow faster, could also lead to therapeutic strategies that serve to inhibit cell proliferation. The results of Dr. Bernstein's study were published in the July 2, 2015, issue of *Molecular Cell*.

The incidence of malignant melanoma, the most lethal form of skin cancer, has been rising steadily over the past 30 years, with roughly 73,870 new cases diagnosed annually in the United States, according to the American Cancer Society. While significant advances have been made in immune and targeted therapies in recent years, distinct subsets of patients either do not respond to these treatments or develop resistance over time.

"Ours was the first study to show that H2A.Z.2 drives melanoma progression by affecting chromatin structure and to identify a specific role for H2A.Z.2 in any tumor type," says Dr. Bernstein. "The next step would be gaining a better understanding of how to prevent H2A.Z.2 from functioning in chromatin." Her research team found that patients who had higher levels of H2A.Z.2 had worse prognoses than those who did not.

Emily Bernstein, PhD

Chromatin is a mass of genetic material that packages DNA and proteins to fit inside the cell nucleus. An emerging theory in cancer research is that abnormal cell growth may result not only from mutations in patients' genes, but also from epigenetic mechanisms, a complex level of gene regulation. Dr. Bernstein's focus on epigenetics examines

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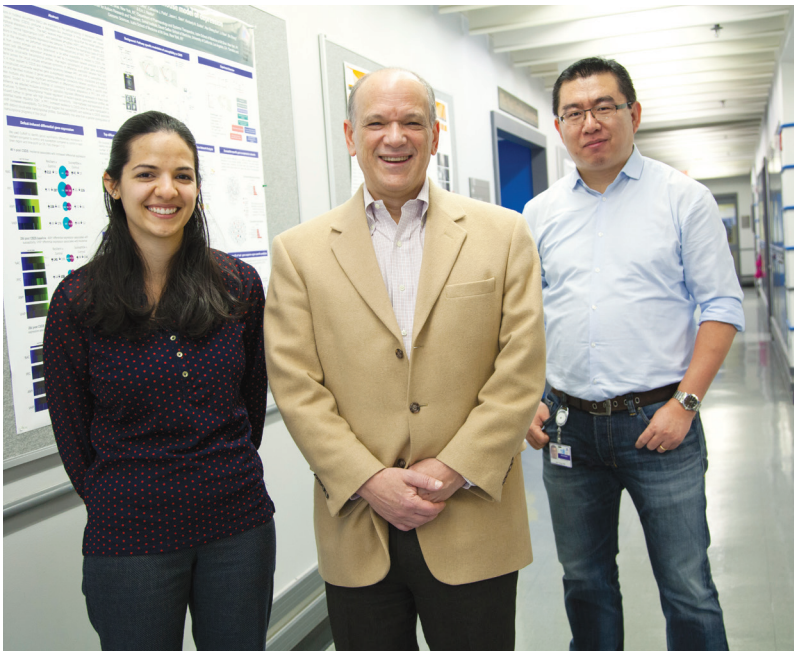
# Study Reveals Mechanisms that Activate Depression

New research at the Icahn School of Medicine at Mount Sinai sheds light for the first time on how depression and emotional resilience operate on a molecular level.

The findings, published in the December 4, 2014, issue of *Nature*, bring fresh perspective to an area that has eluded researchers for decades by outlining the mechanisms within cells that activate depression and laying the groundwork for new treatments. Current drugs for depression focus on neurotransmitters, or communication between cells, but identification of this novel biochemical pathway could pave the way for more effective drugs with very different mechanisms.



From left, Caroline Dias; Eric J. Nestler, MD, PhD; and Jian Feng, PhD

The study's first author, Caroline Dias, an MD/PhD candidate at the Icahn School of Medicine, launched the research as a PhD thesis project. She found that mice became depressed-like when activation levels of the signalling protein beta-catenin (b-Catenin)—located within neurons in the brain's reward and motivation center—were lowered. Conversely, mice exhibited signs of resilience when b-Catenin levels were increased. These results were corroborated through post-mortem studies of human brains. People who had been depressed exhibited lower b-Catenin activation compared to nondepressed individuals.

"Identifying this novel biochemical pathway has opened up a whole new avenue of depression-stress research," says Eric J. Nestler, MD, PhD, Nash Family Professor, Chair of the Department of Neuroscience, and Director of The Friedman Brain Institute at the Icahn School of Medicine at Mount Sinai. "Our molecular findings are very distinct from serotonin and other neurotransmitters previously implicated in depression or resilience against it."

By using next-generation sequencing technology, the research team was able to trace the activation of b-Catenin to a gene called Dicer1, which plays an important role in making microRNAs, small molecules that control gene expression. In the final phase of research, Jian Feng, PhD, a postdoctoral fellow at the Icahn School of Medicine and the study's co-lead investigator, identified a group of microRNAs that are regulated by b-Catenin. These microRNAs may prove to be critical in the pro-resilient effects of b-Catenin.

"The study provides a template for many years of research and potential new treatments," says Dr. Nestler, who is also past President of the American College of Neuropsychopharmacology. "Next, we plan to pursue microRNAs and many of the other targets of b-Catenin. We picked one gene out of 100, and there are many others to study."

"As in other tissues and organs, we can identify cells that are healthier or sicker," says Ms. Dias. "It is obviously more complicated in the brain, but instead of focusing on trying to correct what goes wrong in depression, we can perhaps make neurons healthier by targeting the pathways within the cells that naturally mediate resilience."

Funding for the research was provided by the National Institute of Mental Health and the Hope for Depression Research Foundation.

## The Tisch Cancer Institute Receives National Designation *(continued from page 1)*

Sixty-nine cancer institutions in thirty-five states and the District of Columbia carry the NCI designation. To qualify, Mount Sinai met stringent requirements and demonstrated its strength in laboratory and clinical research, and population science.

In granting the designation, NCI cited The Tisch Cancer Institute's focus on at-risk populations in East and Central Harlem that have a high incidence of aggressive prostate and breast cancers; its comprehensive liver cancer program; a strong immunotherapy program; expertise in environmental health; its World Trade Center First Responders Program; and Mount Sinai's commitment to reducing health disparities among underserved cancer patients.

Mount Sinai's cancer research teams have earned grants totaling $79 million. Renowned physicians and scientists in cancer immunology, cancer cell signaling, cancer genomics and bioinformatics, cancer epidemiology, and cancer pathology are making new discoveries. Their collaborations across the Mount Sinai Health System have led to promising clinical trials.

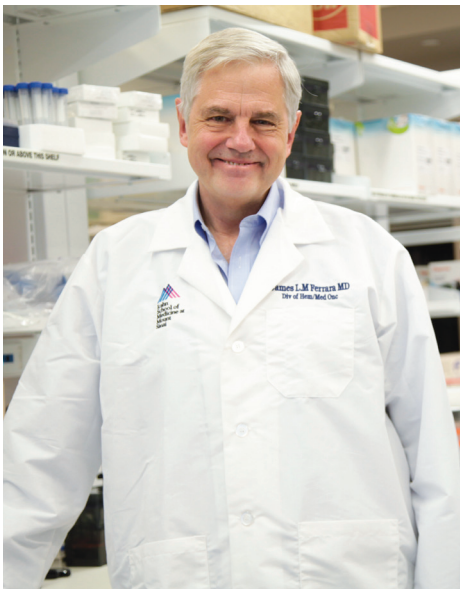
# A New Era for Bone Marrow Transplantation

Seminal research led by James Ferrara, MD, DSc, Ward-Coleman Chair in Cancer Medicine, has produced a promising approach to treating patients with graft-versus-host-disease (GVHD)—a sometimes fatal complication of bone marrow transplantation in which the donor's immune cells attack the recipient's body.

Bone marrow transplants are often used to treat patients with leukemia, lymphoma, and other blood diseases. At the core of this research is a new diagnostic test in the form of a scoring system that predicts each patient's response to GVHD treatment and helps guide the physician. Using several cutting-edge proteomic techniques, Dr. Ferrara and his team discovered three plasma biomarkers (TNFR1, ST2, and Reg3 alpha), which led to a grading system to calculate patient responsiveness.

The new diagnostic vastly improves upon the traditional treatment that has changed little in 40 years, which calls for patients to be given high doses of systemic steroids that are effective only about half of the time.

"Our new scoring system provides for a personalized approach to transplantation so that each patient gets the right treatment at the right time," says Dr. Ferrara, a leading authority on the immunologic complications of bone marrow transplantation, who is also Director of the Hematologic Malignancies Translational Research Center at the Mount Sinai Health System. "People with low-risk GVHD are often overtreated, exposing them to significant side effects. And those with high-risk GVHD are often undertreated, allowing the disease to progress."



James Ferrara, MD, DSc

Equally important, the diagnostic scoring test is paving the way for a new generation of clinical trials that will also test investigative agents for the prevention and treatment of acute GVHD.

To advance the science, Dr. Ferrara recently created the Mount Sinai Acute GVHD International Consortium (MAGIC), comprised of 10 major stem cell transplant centers in the United States and Europe. Later this year, the consortium expects to launch a clinical trial approved by the U.S. Food and Drug Administration, making it the first to treat GVHD using the biomarker grading system.

In addition, Dr. Ferrara plans to actively collaborate with Mount Sinai researchers in the area of Inflammatory Bowel Disease (IBD), which has similar types of inflammation and disease pathways. He hopes to explore ways to genetically engineer bacteria to secrete proteins such as the GVHD biomarker Reg3 alpha, for example, to help protect the gastrointestinal tract.

"We're gathering a critical mass of investigators at Mount Sinai with the ability to push the boundaries of immunotherapy and immunobiology further than ever before," he says.

# Mount Sinai First in U.S. to Use Drug-Coated Balloon for Peripheral Arterial Disease

The Mount Sinai Hospital became the first institution in the United States to use a U.S. Food and Drug Administration (FDA)-approved drug-coated balloon to reopen arteries in a patient's leg. The new device treats arteries above the knee that have been narrowed or blocked by peripheral arterial disease (PAD), a potentially life-threatening condition.

"This drug-coated balloon may be a game changer in the management of patients with peripheral arterial disease," says Prakash Krishnan, MD, Director of Endovascular Services at Mount Sinai Heart, who performed the first procedure with Jose Wiley, MD, and Bhaskar Purushottam, MD. Dr. Wiley is Assistant Professor of Medicine (Cardiology), and Radiology, at Icahn School of Medicine at Mount Sinai. Dr. Purushottam is an endovascular fellow.

In conventional artery procedures, physicians use a balloon to reopen an artery to help restore blood to the limb. In the new procedure, physicians use the traditional balloon to partially open the artery, but also a second balloon coated on its outer surface with the drug paclitaxel to fully open the artery. The drug, which works to prevent inflammation and scar tissue from building up in the area where the balloon was inserted, is applied to the artery wall, where it remains for about a month, and is believed to help prevent new blockages. The new device, the Lutonix® 035 Drug-Coated Balloon (DCB) Catheter, is made by C. R. Bard, Inc.

"Preventing future artery blockages is as important as opening the initial blockage," says Dr. Krishnan, who is also Assistant Professor of Medicine (Cardiology), and Radiology, at Icahn School of Medicine at Mount Sinai.

PAD is believed to affect 8 million Americans. At-risk patients include those with high blood pressure; a family history of an amputation; and a history of atherosclerosis, stroke, or heart attack. Treatment varies, and may include reducing risk by lowering an individual's cholesterol and blood pressure measures; surgical bypass; or endovascular interventions—such

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## Leesa Galatz, MD

Dr. Galatz, a renowned shoulder and elbow surgeon and researcher, has been appointed System Chair of the Department of Orthopaedics at Icahn School of Medicine at Mount Sinai.

Dr. Galatz's clinical practice encompasses traumatic and degenerative disorders of the shoulder and elbow; rotator cuff disorders; arthroscopic surgery of the upper extremity; shoulder instability; shoulder and elbow fractures; arthroplasty of the upper extremity; and minimally invasive fracture fixation.

An active investigator, Dr. Galatz focuses on rotator cuff disease and tendon healing. She is a co-primary investigator on two major projects funded by the National Institutes of Health, which focus on rotator cuff degeneration and repair, and tissue engineering strategies for tendon repair.

Prior to her appointment at Mount Sinai, Dr. Galatz served as Professor of Orthopaedic Surgery and Chief of the Shoulder and Elbow Service at Washington University in St. Louis.

She earned her MD at George Washington School of Medicine and Health Sciences in Washington, D.C., and pursued a fellowship in shoulder and elbow surgery at the Hospital of the University of Pennsylvania.

In addition to serving as Associate Editor for *Basic Science for the Journal of Shoulder and Elbow Surgery*, Dr. Galatz has received numerous awards for her work, including the Charles S. Neer award for Basic Science Research from the American Shoulder and Elbow Surgeons. She has served on the Board of the American Academy of Orthopaedic Surgeons and as a Delegate at Large on the Board of the American Orthopaedic Association.

## Prabhjot Singh, MD, PhD

Dr. Singh, a specialist in neighborhood-based health care system design, has been appointed Director of the Arnhold Global Health Institute at Icahn School of Medicine at Mount Sinai, and Vice Chair of Population Health in the Department of Medicine.

As Institute Director, Dr. Singh will align high-potential global and domestic health activities across the Icahn School of Medicine and the Mount Sinai Health System. As Vice Chair, Dr. Singh will lead the development of educational and research goals for population health within the Department of Medicine, in collaboration with the Department of Population Health Science and Policy.

Prior to his appointment, Dr. Singh served as Director of Systems Design at the Earth Institute at Columbia University, where he also was a faculty member in International and Public Affairs.

Dr. Singh's activities have included global work as Chair of the One Million Community Health Workers Campaign, an initiative of the African Union and the United Nations' Sustainable Development Solutions Network, and involvement in City Health Works, a social enterprise based in Harlem, New York.

Dr. Singh earned his MD at Weill Cornell Medical College, and his PhD in Neural and Genetic Systems at Rockefeller University. His work has been featured in *Proceedings of the National Academy of Science, The Lancet,* the *Bulletin of the World Health Organization, Health Affairs*, and *The New England Journal of Medicine.* His book, *Dying and Living in the Neighborhood,* is due to be published in 2016.

## Barbara G. Vickrey, MD, MPH

Dr. Vickrey, an internationally renowned neurologist and health services researcher, has been named System Chair for the Department of Neurology at Icahn School of Medicine at Mount Sinai.

A National Institutes of Health-funded investigator, Dr. Vickrey leads a cooperative agreement from the National Institute of Neurological Disorders and Stroke (NINDS) for a five-year, stroke prevention/intervention research program in health disparities. She has created and is testing in randomized controlled trials, innovations in health care delivery for control of post-stroke risk factors in underserved populations in Los Angeles County, and for improving quality of care for veterans with Parkinson's disease.

Her research has also demonstrated that both quality of care and outcomes for dementia patients and caregivers can be substantially improved through a collaborative approach that engages health care systems, community organizations, patients, and caregivers.

For 25 years, Dr. Vickrey served on the faculty of the University of California, Los Angeles (UCLA), where she was Professor of Neurology, Director of the departmental Health Services Research Program, and Associate Director for Research at the Greater Los Angeles VA Parkinson's Disease Research, Education and Clinical Center. In 2011, she was elected to the Institute of Medicine of the National Academies of Sciences, Engineering, and Medicine.

Dr. Vickrey earned her MD at Duke University School of Medicine and her MPH at the UCLA Fielding School of Public Health. She completed postgraduate clinical training in medicine and neurology at the University of Washington in Seattle.

# The Mount Sinai Health System Establishes the Ronald M. Loeb Center for Alzheimer's Disease

Daniel S. Loeb, CEO and Founder of investment advisor Third Point LLC, and his wife, Margaret Munzer Loeb, recently made a $15 million gift to establish the Ronald M. Loeb Center for Alzheimer's Disease in memory of Daniel's father. The Center's mission is to advance research and clinical care for patients with Alzheimer's disease through discoveries in genomics, neurobiology, stem cell engineering, and other disciplines.

The Loeb Center will be led by Alison Goate, PhD, a highly regarded neuropsychiatric researcher and molecular geneticist at Icahn School of Medicine at Mount Sinai, who will work in concert with three renowned faculty members: Mary Sano, PhD, Associate Dean for Clinical Research, and Professor of Psychiatry; Sam Gandy, MD, PhD, Mount Sinai Professor in Alzheimer's Research,

From left: Eric J. Nestler, MD, PhD, Nash Family Professor and Chair, Department of Neuroscience, Director of the Friedman Brain Institute; Alison Goate, PhD, Senior Faculty, Neuroscience, Neurology, and Genetics and Genomic Sciences; and Daniel Loeb

Professor of Neurology and Psychiatry, and Associate Director, Mount Sinai Alzheimer's Disease Research Center; and Eric Schadt, PhD, Jean C. and James W. Crystal Professor of Genomics, Chair, Genetics and Genomic Sciences, and Director, Icahn Institute for Genomics and Multiscale Biology.

"When my father was sick, I learned how painful this disease is for those afflicted and their families," says Mr. Loeb. "It is my hope that this Center will bring together the best in the field to find the breakthrough we so urgently need."

Kenneth L. Davis, MD, President and Chief Executive Officer of the Mount Sinai Health System, and a groundbreaking researcher in Alzheimer's disease, says, "We are deeply grateful for the Loeb family's immense generosity and unique vision. There has been a revolution in the way we think about Alzheimer's disease, and that revolution has brought us to the threshold of major breakthroughs, which we will vigorously pursue at the Ronald M. Loeb Center."

# The Lauder Family Cardiovascular Ambulatory Center Opens

The Mount Sinai Hospital recently opened its 20,700-square-foot Lauder Family Cardiovascular Ambulatory Center. The expansive Center, which will allow Mount Sinai physicians to treat nearly 300 heart and vascular outpatients a day, was established with generous support from Ronald S. Lauder and Leonard A. Lauder and their families in honor of Valentin Fuster, MD, PhD, the Director of Mount Sinai Heart and Physician-in-Chief of The Mount Sinai Hospital.

"I have the deepest gratitude for the Lauders for their confidence in Mount Sinai Heart and especially for their vision," said Dr. Fuster. "The future of health care is the ambulatory setting as we move from treating disease to a focus on promoting health." Dr. Fuster also thanked Mitzi and Warren Eisenberg, who donated the Center's large patient reception area in their name.

Kenneth L. Davis, MD, President and Chief Executive Officer of the Mount Sinai Health System, told the donors, "Your philanthropy makes transformative cardiovascular care possible at this Center. We are grateful you have shared your generosity with us."

Dennis S. Charney, MD, Anne and Joel Ehrenkranz Dean, Icahn School of Medicine at Mount Sinai and President for Academic Affairs, Mount Sinai Health System, said, "We are committed to providing the best cardiovascular care, today and tomorrow. Thank you for making this a reality."

From left: Dennis S. Charney, MD; Valentin Fuster, MD, PhD; Leonard A. Lauder; Ronald S. Lauder; and Kenneth L. Davis, MD

Joseph M. Sweeny, MD, has been named Medical Director of the Center, and Haydee Garcia, NP, is Nursing Director. The team will include more than 40 cardiologists and vascular physicians, 18 fellows, and more than 60 nursing, clinical, and administrative support staff, among them a nutritionist, social worker, and four patient navigators. The Center, located in the Guggenheim Pavilion lobby, offers specialized patient care in cardiovascular disease prevention, general cardiology, cardiac imaging, cardiac rehabilitation, heart failure and transplantation care, vascular medicine, and vascular surgery.

The Center has 22 exam rooms, five vascular ultrasound rooms, and a patient library. Colorful photographs of nature, taken by the late Evelyn H. Lauder and donated by the Lauder family, adorn the walls.

To learn more, visit mountsinai.org/laudercenter.

## Researchers Identify Key Protein in Melanoma Growth

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histone proteins that package DNA and the factors that influence them as they switch genes on and off.

The most promising discovery was that removing H2A.Z.2 from melanoma cells made them more sensitive to chemotherapy and the targeted therapies that focus on genetic mutations. In theory, the new finding could lead to clinical trials that would combine the use of chemotherapy or targeted therapies with a method of depleting a patient's levels of H2A.Z.2.

Researchers from New York University Langone Medical Center, Ludwig-Maximilians University in Germany, and the Max-Planck Institute of Biochemistry in Germany also collaborated on the study.

## Mount Sinai First in U.S. to Use Drug-Coated Balloon for Peripheral Arterial Disease

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as stents or traditional balloon therapy.

Angioplasty procedure data show that using nondrug-coated balloons could result in restenosis—the renarrowing of blood vessels—following a procedure in nearly 50 percent of patients. By comparison, clinical trial studies show that restenosis occurs in only approximately 28 percent of patients with drug-coated balloons.

Mount Sinai was one of 54 sites in the world participating in the LEVANT-2 pivotal study, a global randomized clinical trial that compared the new drug-coated balloon to the standard therapy of using a nondrug-coated balloon. The study results, which helped lead to the device's FDA approval, demonstrated the technology improved blood flow in arteries, increased patient mobility for walking longer distances, and reduced the rates of blood clots.

Dr. Krishnan served as principal investigator at Mount Sinai for the study. He also is a consultant for C. R. Bard, Inc., the maker of the drug-coated balloon.

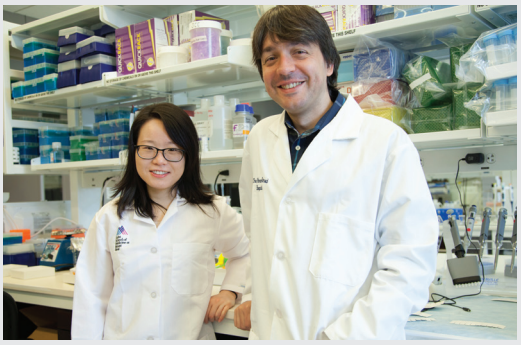
PHOTO ESSAY

# Exploring Diverse Microbes in an Isolated Tribe

Image courtesy of Oscar Noya-Alarcon

A population of Yanomami Amerindian hunter-gatherers, who until recently had lived in isolation in the remote Venezuelan Amazon, is yielding a trove of information for scientists at Mount Sinai who are studying their microbiome and finding the most diverse levels of bacteria and bacteria-encoded functions ever discovered in humans.

"This is like having a time machine and going back in time to explore what microbes we used to harbor," before exposure to antibiotics or processed food, says Jose C. Clemente, PhD, Assistant Professor of Genetics and Genomics at Icahn School of Medicine at Mount Sinai. He is the first author of a collaborative study with researchers in Venezuela and at New York University School of Medicine, University of Colorado, and Washington University School of Medicine. Their paper, which appeared in the April 17, 2015, issue of *Science Advances*, is the first attempt to document the microbiome of people with no previous exposure to industrialization whose lifestyles are similar to those of our human ancestors.



PhD candidate Nan Shen and Jose C. Clemente, PhD, are documenting the bacteria and bacteria-encoded functions of the Yanomami Amerindians in Venezuela.

By working with the tribe's bacteria—taken from the skin, mouth, and feces of up to 30 villagers between the ages of 4 and 50—the scientists have an unprecedented opportunity to learn about microorganisms that might have been already eradicated in other humans and determine whether they are advantageous or deleterious to human health.

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## Icahn School of Medicine at Mount Sinai is Home to 24 Multidisciplinary Institutes

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EXPERIMENTAL THERAPEUTICS INSTITUTE

THE FRIEDMAN BRAIN INSTITUTE

GLOBAL HEALTH AND EMERGING PATHOGENS INSTITUTE

ICAHN INSTITUTE FOR GENOMICS AND MULTISCALE BIOLOGY

IMMUNOLOGY INSTITUTE

INSTITUTE FOR ADVANCED MEDICINE

INSTITUTE FOR CRITICAL CARE MEDICINE

INSTITUTE FOR HEALTH CARE DELIVERY SCIENCE

INSTITUTE FOR MEDICAL EDUCATION

THE INSTITUTE FOR PATIENT CARE

INSTITUTE FOR TRANSLATIONAL EPIDEMIOLOGY

THE MINDICH CHILD HEALTH AND DEVELOPMENT INSTITUTE

THE MIRKEN FAMILY CLINICAL NEUROSCIENCE INSTITUTE

MOUNT SINAI INSTITUTE OF TECHNOLOGY

MOUNT SINAI–NATIONAL JEWISH HEALTH RESPIRATORY INSTITUTE

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