Massry Prize winners discuss mechanics of protein movement in cells

By Ryan Ball

Next time you’re sitting in freeway gridlock, consider the complex system of traffic moving through each and every one of your cells — proteins and other molecules all trying to get to the right place at the right time to perform a specific function, such as contacting muscles so you can lay on the horn when the distracted driver in front of you doesn’t move.

Uncovering the mechanisms through which intracellular traffic works earned researchers Michael P. Sheetz, PhD, of Columbia University; James A. Spudich, PhD, of Stanford University and Ronald D. Vale, PhD, of the University of California, San Francisco, the 2013 Massry Prize.

The multidisciplinary trio, who began working together in the 1980s, visited the Health Sciences Campus on Oct. 10 to discuss their work in defining the protein motors that move molecules inside the cell. They also identified the fuels for those motors, a multifunctional molecule known as ATP that transports chemical energy within cells.

According to Shaul G. Massry, MD, professor emeritus of medicine and physiology & biophysics at the Keck School of Medicine of USC, the discovery is significant because many diseases develop because of abnormal transport of proteins.

“Imagine a post office,” Massry said. “You put your mail in, and they need to take it to a certain address. If they take it to another address, there is chaos. If we don’t understand how cells function, we’ll never be able to treat derangements.”

One abnormality Spudich has been studying is hypertrophic cardiomyopathy, a hereditary condition that affects one in 500 people and is often to blame when seemingly healthy athletes suddenly die during strenuous exercise. A protein that is one of the largest protein complexes found in cells. He said dynesin has the massive challenge of communicating small chemistry over a relatively long distance in the cell, its fuel-bonding site to its “feet” so that it can walk along its microtubule track within the cell.

Vale and his team have detectors investigating how this protein moves, they have uncovered a lot of clues, but have not yet solved the mystery. Still, each clue brings science closer to understanding how to study the many proteins that remain to be studied in biological systems.

“I think we’re really going to need to understand the details of how these protein machines work if we’re going to think of new strategies of treating disease,” said Vale.

Sheetz focused his lecture on how cells use their protein motors and other motility mechanisms to sense their environment and to interact dynamically and create the shape of the organism. He’s interested in the feedback mechanisms through which cells sense surface rigidity, an issue at the heart of cancer and many other diseases when rigidity-dependent growth becomes abnormal.

“How the cell reacts to that environment and tests that environment decides whether that environment is conducive or not,” Vale said.

Humayun named inaugural USC Eye Institute director

By Leslie Ridgeway

Mark Humayun, MD, PhD, internationally known for his work on the Argus II artificial retina implant intended to restore sight to the blind, has been named the inaugural director of the USC Eye Institute and interim chair of the USC Department of Ophthalmology.

In his new role, Humayun will take the reins in overseeing advanced surgical techniques and comprehensive care for patients. He will also continue to lead and guide cutting edge transformative research.

“The USC Eye Institute and the USC Department of Ophthalmology together offer a top-ranked clinical practice and world-class research with the potential to cure prevalent and challenging diseases of the eye,” said Humayun. “The groundbreaking work at the USC Eye Institute will lead to transformative new solutions for preserving and restoring sight and the USC Department of Ophthalmology will be the conduit that provides these treatments safely and effectively to patients with vision problems.”

Humayun is professor of ophthalmology, biomedical engineering, and cell and neurobiology at the Keck School of Medicine of USC and the USC Viterbi School of Engineering.

Academy of Engineering.

In a joint statement, Elizabeth Garrett, JD, USC provost and senior vice president for academic affairs, Carmen Puliafito, MD, MBA, dean of the Keck School of Medicine of USC, and Tom Jackiewicz, MPH, the National

USC study: Alzheimer’s-linked genetic mutation doubles brain tissue loss rate

By Alison Trinidad

People who carry a genetic mutation associated with Alzheimer’s disease may develop the disease three years earlier than expected, according to a new study from Keck Medicine of USC.

Scientists at the Keck School of Medicine of USC have mapped the effects of that genetic mutation, showing for the first time how the Alzheimer’s risk factor affects the living human brain. The discovery is detailed in the Oct. 17 edition of The New England Journal of Medicine alongside five other studies focused on the TREM2 gene variant, whose link to Alzheimer’s was first reported in January.

“Our lab studies the rate of brain tissue loss in elderly people, trying to discover factors that protect you as you age,” said Paul M. Thompson, PhD, professor of neurology, psychiatry, engineering, radiology and ophthalmology and the study’s principal investigator. “We have never seen such a dramatic effect as with this genetic variant. If you carry this genetic mutation, we’ve found that there is this wildfire of tissue loss in the brain.”

Healthy people typically lose less than 1 percent of their brain tissue a year, offset by normal tissue generation from mental stimulation, Thompson said. Symptoms of Alzheimer’s begin to manifest when approximately 10 percent of the brain’s tissue has eroded away.

“This is the first study to use brain scans to show what this gene variant does, and it’s very surprising,” Thompson said. “This gene spurs up brain loss at a terrific pace. Carriers of this genetic mutation, who comprise about 1 percent of the population, lose about 3
Keck School researchers awarded grant to study Kaposi’s sarcoma-associated herpesvirus

By Jon Nalick

The National Institutes of Health (NIH) have awarded Keck School of Medicine of USC researchers a five-year, $7.5 million grant to investigate how Kaposi’s sarcoma-associated herpesvirus (KSHV) evades the immune system and triggers certain cancers.

Principal investigator Jae Jung, PhD, the Fletcher Jones Foundation Chair and Hastings Foundation Professor of Molecular Microbiology and Immunology at the Keck School, said the research aims to find ways to short circuit the development of Kaposi’s sarcoma. This malignant tumor, often caused by KSHV, is more prevalent among people with compromised immune systems, such as patients with AIDS.

In Africa, he said, AIDS is endemic and advanced medical treatment is spotty. Kaposi’s sarcoma causes as many as half of all cancer deaths.

Working closely with physicians and researchers to enable them to do their best in clinical practice as well as translational and basic vision research is a priority for Humayun. “We plan to achieve our new goals through continued emphasis on clinical, research and educational missions,” he said.

Humayun is internationally recognized for his work on the treatment of the most debilitating and challenging eye diseases through advanced engineering. This includes the development of therapies for retinal degenerations such as retinitis pigmentosa; macular degenerations such as age-related macular degeneration; retinovascular diseases such as vein occlusions; diabetic retinopathy and retinal detachments.

Principal investigator Jae Jung received a $7.5 million grant to help discover how to short circuit development of Kaposi’s sarcoma.

HUMAYUN: Best work in clinical practice/translational, basic vision research a priority

Continued from Page 4

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Did you know?

In 2013, USC announced an expansion of cancer care facilities made possible by a $15 million donation from the Kenneth T. and Eileen L. Norris Foundation. The gift supports the construction of the Norris Healthcare Consultation Center, a new outpatient clinic building currently under construction on the USC Health Sciences Campus.

Established in 1963, the Norris Foundation has a long and extensive history of giving to USC, beginning with the philanthropic work of Eileen L. Norris, the mother of Eileen and Kenneth T. Norris, who funded the Norris Medical Library, the Eileen L. Norris Cinema Theatre and the Norris Dental Center at USC.

That tradition of giving was continued under the guidance of Kenneth T. Norris, Jr., whose lead donations helped establish the USC Norris Comprehensive Cancer Center.

The National Heart, Lung and Blood Institute has awarded a five-year, $4 million grant to a USC research team to discover whether stress in the lives of working mothers influences risk of childhood obesity in their children.

The project, “Maternal Stress and Children’s Obesity Risk,” led by Genevieve Dunton, PhD, MPH, will monitor stress levels in mothers through the use of a smartphone app, as well as through salivary cortisol.

“We will examine how parenting practices related to children’s eating and physical activity such as modeling, restriction, and encouragement may be compromised on days when mothers experience higher levels of stress,” said Dunton, assistant professor in the Departments of Preventive Medicine and Psychology at the Keck School of Medicine of USC.

Approximately 200 ethnically and economically diverse working mothers and their 9- to 11-year-old children will participate in the study over a three-year period, allowing the research team to track obesity risk trajectories during the pre-teen and early teen years.

“Parental stress is an understudied factor that may undermine parenting practices related to children’s dietary intake and physical activity,” said Dunton.

“This study will help to identify families whose children are at greater risk of obesity progression into adolescence based on working mothers’ levels of stress.”

In addition to recognizing at-risk children, researchers will working on the project will develop tools to help mothers reduce the impact of stress on their children’s eating habits and physical activity.

“The results will inform the development of novel interventions that help working mothers to reduce the negative effects of stress on weight-related parenting practices and foster family environments that can buffer the effects of maternal stress on children’s obesity risk,” Dunton said.

“Given the detrimental health effects and enormous costs of childhood obesity, such information could be of significant value to efforts to improve public health.”

This study brings together an interdisciplinary team of researchers from the Keck School of Medicine of USC, Dornsife College of Letters, Arts, and Sciences; the USC Davis School of Gerontology; and the USC Spatial Sciences Institute.

$4 million grant received to study maternal stress/childhood obesity links

New Keck Medicine PR exec to lead Creative Services

USC Health Sciences Public Relations and Marketing has appointed Tom DeSanto as executive director to lead its newly minted creative services division, bringing with him nearly 20 years’ experience working with more than 50 hospitals and health systems as a healthcare communications leader.

As executive director, DeSanto will be responsible for further developing the department’s creative services team, overseeing the division, and managing the division’s revenues.

DeSanto will oversee Keck Medicine, USC Norris Cancer Research, The Weekly and other Keck Medicine of USC publications, as well as new publications being developed for consumers and referring physicians.

DeSanto will guide strategic communications initiatives and lead creative and design services in support of the hospital and health system, Keck School and health-sciences development. He also will be instrumental in the further development and implementation of Keck Medicine brand identity guidelines.

“This comes to us with a substantial background in advertising and a strong track record for results,” Thompson said.

DeSanto was president and lead consultant for San Diego-based Tom DeSanto Strategy & Communications. He also served as executive vice president of strategic and creative services for an East Coast agency that specialized in healthcare marketing.

DeSanto has provided strategic planning, creative direction and brand positioning support to organizations such as Loyola University Health System, NYU Langone Medical Center, Geisinger Health System, Thomas Jefferson University Hospital, Blue Cross Blue Shield of Delaware and University of the Sciences in Philadelphia.

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The USC Coulter Translational Program is accepting funding applications.

The USC Coulter Translational Research Partnership Program is seeking USC faculty applicants for its Pilot and Seed Programs. The submission deadline for pre-proposals is Jan. 15, 2014. The program is open to all faculty members, and the multistep review includes development of a full proposal and an investor pitch.

The one-year awards are for up to $100,000. Project proposals are evaluated on their clinical merit, potential health-care impact and significance, time line and pathway to commercialization and potential for obtaining further financial investment to translate the particular solution to health care.

The program seeks to fund groundbreaking projects that solve an unmet need through the use of engineering solutions. The goal of the USC Coulter Program is to support the development of novel health-care solutions for partnership with a commercial entity and investors to bring concepts to market. Project proposals at all stages of development from concept to implementation are invited for assessment, although the program does not fund discovery research.

The USC Coulter Program is a collaboration between the Wallace H. Coulter Foundation and the Biomedical Engineering Department at the Viterbi School of Engineering. USC partners in the program include the USC Viterbi School of Engineering, the Southern California Clinical and Translational Science Institute within the Keck School of Medicine of USC, and the USC Stevens Center for Innovation.

Applications are available online at http://coulter.usc.edu/programs-services. Inquiries can be directed to coulterus@gmail.com.

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**Calendar of Events**

**Friday, Nov. 22**

Noon – 1 p.m. Department of Medicine: Grand Rounds. “Glucocorticoid Induced Osteoporosis,” Jennifer Johnson, USC New Facility, Inpatient Tower Room (22104-B). Info: (323) 226-7586

**Tuesday, Nov. 26**


**Wednesday, Dec. 4**

11:30 a.m. – 2 p.m. USC Health Systems Improvement Collaborative. “Can We Master Patient Safety? Tools, Trends, and Technologies” panel discussion, various speakers. Broad CIRM Center Seminar Room. Info: http://hsic.usc.edu/.

**Friday, Dec. 6**


Noon – 1 p.m. Department of Cardiovascular Medicine: Grand Rounds. “ Biomarkers in Heart Failure,” Alan Maisel, USC, Horlitz Seminar Room, ZNI 112. Info: (323) 442-6130

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**MASSRY: Discovering how to study proteins**

Continued from Page 1 cell lives or dies,” Sheets said.

The Meira and Shaul G. Masary Foundation established the Masary Prize in 1996 to recognize outstanding contributions to the biomedical sciences and the advancement of health. Each year, a scientific theme is chosen by the Foundation, and a committee of distinguished professors representing both USC and UCLA selects the laureates. The Masary Prize activities at USC are hosted by the USC Institute for Genetic Medicine.

Sheets, Spudich and Vale find themselves in good company, considering 12 of the 31 Masary recipients have gone on to receive the Nobel Prize. Most recently, 2010 Masary laureates James E. Rothman and Randy Schekman were awarded the 2013 Nobel Prize in Physiology or Medicine. The full 2013 Masary Prize lectures can be viewed at http://tinyurl.com/finalline.

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**In case of an emergency...**

Call the Emergency Information Phone: (213) 740-3323. The emergency telephone system can handle 1,400 simultaneous calls. It also has a backup system on the East Coast.

Visit the USC Web: http://emergency.usc.edu This page will be activated in case of an emergency. Backup Web servers on the East Coast will function if the USC servers are incapacitated.