

Disastrous day at USC goes according to plan

By Ryan Ball

At 8:45 a.m. on Nov. 15, a 7.8 magnitude earthquake rocked Los Angeles, causing injuries and structural damage on both USC campuses. On the Health Sciences campus, smoke billowed from burning buildings. Environmental health and safety crews responded to chemical spills while search and rescue teams worked to free patients, students, staff and faculty trapped in buildings.

Luckily, none of it was real. But, one of these days, it may be. That's why the USC Office of Fire Safety & Emergency Planning oversaw the largest emergency preparedness drill ever performed at HSC. Part of a statewide health and medical disaster exercise, the two-and-a-half-hour drill concluded with a debriefing to discuss things that went well and areas that require improvement.

"This was the first disaster drill on the Health Sciences campus that tested the coordination and communication among all emergency response departments, the schools and the hospitals at the same time," said Steve Goldfarb, certified emergency manager with the USC Office of Fire Safety & Emergency Planning. "There was excellent communication and collaboration among all of the groups. The drill validated the great work each department and school has done to prepare the Health Sciences campus for a major disaster."

Hazardous materials tech Demetrius Spillers said one

See **DRILL**, page 3



Above, an emergency response team simulates the rescue of a person injured and pinned by a heavy object. Below, Facilities Coordinator Wayne Tulloss provides an assessment on the status of various buildings around campus.



USC/CHLA research shows increased autism risk for infants exposed to air pollution

By Leslie Ridgeway

Research conducted by University of Southern California (USC) and Children's Hospital Los Angeles scientists demonstrates that polluted air—whether regional pollution or coming from local traffic sources—is associated with autism.

The study titled "Traffic Related Air Pollution, Particulate Matter, and Autism," shows that exposure to traffic-related air pollution during pregnancy and the first year of life is associated with a more

than two-fold risk of autism.

In addition, exposure to regional pollution consisting of nitrogen dioxide (NO₂) and small particles—particulate matter less than 2.5 and 10 microns in diameter (PM_{2.5} and PM₁₀)—is also associated with autism even if the mother did not live near a busy road. The study is published in the *Archives of General Psychiatry*, a sister publication of the *Journal of the American Medical Association*.

"This work has broad potential public health implications," said the study's

principal investigator, Heather Volk, assistant professor of preventive medicine at the Keck School of Medicine of USC and investigator in the Division of Research on Children, Youth and Families at Keck School-affiliated Children's Hospital Los Angeles. "We've known for a long time that air pollution is bad for our lungs, and especially for children. We're now beginning to understand how air pollution may affect the brain."

The research is the first to look at the amount of near-

NIH awards \$9 million for USC cell study

By Ryan Ball

The National Institutes of Health (NIH) has awarded a \$9 million grant to Keck School of Medicine researchers Jim Knowles and Robert Chow of the Zilkha Neurogenetics Institute (ZNI) to examine single-cell transcriptomes.

A transcriptome is the set of all RNA molecules produced in cells. The grant is part of the \$90 million Single Cell Analysis Program (SCAP), funded by the NIH Common Fund.

Now that the technology involved in sequencing RNA has advanced to the point where researchers can sequence the total RNA from single cells, it is clear that not all cells are created equal, even those that appear to be identical.

"With the small amount of work that has been done looking at actual individual cells, we're starting to see that there is a significant amount of cell-to-cell variation," said Knowles, co-director of the Center for Genomic Psychiatry.

"One of our major goals is to define how much of this variability is due to true biological variability and how much is due to technical noise," added Chow, associate professor of physiology & biophysics and director of the USC-Caltech MD-PhD Program.

He added, "Having established the sources of noise, we will use the new technology to study how neuronal stimulation leads to changes in the transcriptome, how fast these changes occur, and what

genes are activated."

The increased sensitivity of the new RNA-sequencing technology is expected to have immediate impact on basic science research and has the potential to play a role in advanced personalized medicine.

"In malignant tumors, we know that cancer cells continuously multiply and undergo mutations," said Chow. "This leads tumors to be composed of many cells that are actually quite different one from another. It explains why cancers are so resistant to treatment, since the variability among cells increases the chance that one or a few cells will have the ability to survive any given treatment. The new technology will give us the ability to spy on the changing transcriptomes of cancer cells."

Transcriptome studies also have the potential to allow researchers to understand the genetic programming changes occurring in cells of the developing embryo.

An important aspect of the work being done by Chow and Knowles is performing a service to the broader neuroscience community by submitting to a database the transcriptomes for thousands of cells of at least four cell types.

ZNI is one of three research centers to receive SCAP awards, along with UC San Diego and the University of Pennsylvania. The grants will also fund 15 high-risk/high-impact studies involving single-cell analysis.

traffic-related pollution," she said. "We also examined data from air quality monitors, which measure pollution over a larger region that could come from traffic, industry, rail yards or many other sources."

In the 2012 study, Volk and colleagues from USC and the University of California, Davis examined data on 279 autism cases and 245 control subjects enrolled in the California-based Childhood Autism Risks from Genetics and the Environment (CHARGE) study. Mothers' addresses

See **AUTISM**, page 2

OT/PT Forum brings together USC's top-ranked therapy disciplines

By Mike McNulty

The Nov. 12 USC Occupational Therapy and Physical Therapy Forum brought together students and faculty from USC's top-ranked therapy professions for an evening of interdisciplinary learning and collaborative problem solving.

The forum, a joint effort between the USC chapter of the national occupational therapy student honor society, Pi Theta Epsilon, and the USC Physical Therapy Student Association, began with a viewing of research posters displaying current studies and publications by faculty, staff and students.

James Gordon, associate dean and chair of the USC Division of Biokinesiology and Physical Therapy, and Julie McLaughlin Gray, director of the USC occupational therapy master's degree program, welcomed the



Occupational therapy students (from left) Katie Thompson, Irene Ng, Jenna Kobara and Karen Wei discuss clinical case scenarios with physical therapy students Stephen Peres and Tim Chen.

Steve Mar

the reasoning behind their assessment, treatments and goals, highlighting ways in which interdisciplinary collaboration improved real-world treatment and outcomes.

Ingrid Leu, vice president of Pi Theta Epsilon, said, "It was rewarding to look around the room and see occupational therapy and physical therapy students talking and interacting with students from the other discipline."

Stephen Peres, president of the physical therapy class of 2014, noted that he "liked to pick the occupational therapy students' brains about assessments to see if physical therapy assessments are applicable, and if the vocabulary is similar."

While often working side-by-side in health and rehabilitation settings, occupational therapists and physical therapists each have unique roles in the provision of clinical care. Occupational therapy is principally concerned with improving a person's ability to perform everyday activities, and physical therapy is primarily concerned with improving a person's mobility, or movement.

What occupational therapy and physical therapy do have in common at USC is that both currently hold the No. 1 ranking by *U.S. News & World Report* of educational programs in their respective disciplines.

The USC Division of Occupational Science and Occupational Therapy has held the top ranking of occupational therapy graduate education for more years than all other programs in the country combined, while the USC Division of Biokinesiology and Physical Therapy has held the top ranking of physical therapy graduate education since 2004.

audience. Both conveyed the necessity of interprofessional collaboration in delivering high quality patient care.

Pairs of occupational therapists and physical therapists presented case studies from their practices.

Cases included outpatient treatment of a patient with multiple sclerosis, orthopedic rehabilitation at Keck Medical Center of USC, and acute care scenarios at Children's Hospital Los Angeles. The therapist pairs explained

Keck Medical Center clinicians shine in field of pain management

Two Keck Medical Center of USC clinicians were recently honored for their excellence in cancer pain management. Keck Hospital of USC 9-East nurse Marlene Morales and pharmacist Kum-Ja Lee were recognized at the Southern California Cancer Pain Initiative's (SCCPI) 11th annual gala, held on Oct. 27.

Keck Medical Center nurse practitioner Pamela Merriam, a SCCPI board member and former award winner, presented awards at the gala.

Hospital leaders congratulated Morales and Lee on their recognitions.

SCCPI is a 3,600-member nonprofit, interdisciplinary and volunteer organization dedicated to working with professional and regulatory agencies to remove barriers to optimal cancer pain relief to individuals suffering from cancer pain.



AUTISM: Study suggests that pollution may be bad not only for the lungs, but for the brain as well

Continued from page 1

from birth certificates and addresses reported from a residential history were used to estimate exposure during each trimester of pregnancy and the first year of life. The researchers used air pollution levels derived from the

Environmental Protection Agency's Air Quality System to determine exposure to NO₂, PM_{2.5} and PM₁₀. They also applied dispersion models to estimate the amount of traffic the mothers and children were exposed to.

Particularly interesting was

the effect of mothers' and children's exposure to particles, both PM₁₀ and PM_{2.5}. PM₁₀ includes both coarse and fine particles, while PM_{2.5} includes only the smaller (fine) particles, which are most likely to have deleterious effects on the human body.

"From studies conducted in the lab, we know that we can breathe in tiny particles and they can produce inflammation," said Volk. "Particles have varied composition, and there are many chemicals that can bind to them. The components of these particles could be hazardous to the brain."

Other researchers who participated in the study include Irva Hertz-Picciotto, University of California, Davis; Rob McConnell from

USC; and Fred Lurmann and Bryan Penfold from Sonoma Technology, Inc.

The research was funded by the National Institute of Environmental Health Sciences (grant 1 R21 ES019002-01).

Volk and colleagues are now at work on a study of how genes related to autism may be affected by environmental exposures to try to identify if there are factors that make people genetically more vulnerable to particular pollutants.

USC Coulter Translational Program offers research grants of up to \$100,000

The USC Coulter Translational Program is seeking USC faculty applicants for its pilot funding program. The submission deadline is Dec. 15.

The one-year awards are for up to \$100,000. The USC Coulter Program is a collaboration between the Wallace H. Coulter Foundation, the Department of Biomedical Engineering at the USC Viterbi School of Engineering, the Southern California Clinical and Translational Science Institute, and the USC Stevens Center for Innovation.

The program seeks to fund groundbreaking projects that solve an unmet or underserved clinical need through the use of biomedical engineering solutions. Applications are available online at <http://stevens.usc.edu/CoulterProgram.php> and inquiries can be directed to usc-coulter@usc.edu.

The Weekly

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High fructose corn syrup linked to increased global prevalence of diabetes

By Leslie Ridgeway

A new study by University of Southern California (USC) and University of Oxford researchers indicates that large amounts of high fructose corn syrup (HFCS) found in national food supplies across the world may be one explanation for the rising global epidemic of type 2 diabetes and resulting higher health care costs.

The study reports that countries that use HFCS in their food supply had a 20 percent higher prevalence of diabetes than countries that did not use HFCS. The analysis also revealed that HFCS's association with the "significantly increased

prevalence of diabetes" occurred independent of total sugar intake and obesity levels.

The article, "High Fructose Corn Syrup and Diabetes Prevalence: A Global Perspective," is published in the journal *Global Public Health*.

"HFCS appears to pose a serious public health problem on a global scale," said principal study author Michael I. Goran, professor of preventive medicine, director of the Childhood Obesity Research Center and co-director of the Diabetes and Obesity Research Institute at the Keck School of Medicine of USC. "The study adds to a

growing body of scientific literature that indicates HFCS consumption may result in negative health consequences distinct from and more deleterious than natural sugar."

The paper reports that out of 42 countries studied, the United States has the highest per capita consumption of HFCS at a rate of 25 kilograms, or 55 pounds, per year. The second highest is Hungary, with an annual rate of 16 kilograms, or 47 pounds, per capita. Canada, Slovakia, Bulgaria, Belgium, Argentina, Korea, Japan and Mexico are also relatively high HFCS consumers. Germany, Poland, Greece, Portugal, Egypt,

Finland and Serbia are among the lowest HFCS consumers. Countries with per capita consumption of less than 0.5 kilogram per year include Australia, China, Denmark, France, India, Ireland, Italy, Sweden, the United Kingdom, and Uruguay.

Countries with higher use of HFCS had an average prevalence of type 2 diabetes of 8 percent compared to 6.7 percent in countries not using HFCS.

"This research suggests that HFCS can increase the risk of type 2 diabetes, which is one of the most common causes of death in the world today," said study co-author Stanley Ulijaszek, director of the Institute of Social and Cultural Anthropology at the University of Oxford.

The article proposes that this link is probably driven by higher amounts of fructose in foods and beverages made with HFCS. Fructose and glucose are both found in ordinary sugar (sucrose) in equal amounts, but HFCS has a greater proportion of fructose. The higher fructose content makes HFCS sweeter and provides processed foods with greater stability and

better appearance because of the more consistent browning color when foods made with higher fructose are baked.

In a previous related study, the authors found that the fructose content in some U.S.-produced soft drinks, especially the most popular, was about 20 percent higher than expected, suggesting that some manufacturers might be using HFCS with more fructose than previously estimated. Such differences could "potentially be driving up fructose consumption in countries that use HFCS," the researchers said. The study notes the difficulty in determining the actual amount of fructose in foods and beverages made with HFCS because of "a lack of industry disclosure on food labels."

Growing evidence reveals that the body metabolizes fructose differently from glucose. Among other things, fructose metabolism occurs independently of insulin, primarily in the liver where it may be readily converted to fat, which likely contributes to non-alcoholic fatty liver disease, a condition on the rise in Hispanics in the U.S. and Mexico.

PT student wins \$7,500 in national tuition contest

Zuleima B. Hidalgo, USC Doctor of Physical Therapy student (Class of 2015), has received a \$7,500 scholarship from the national Dr Pepper \$100,000 Tuition Giveaway contest.

A photo of the smiling student appeared on cans, the two-liter bottle and 12-pack boxes of Dr Pepper Diet Cherry soda, accompanied by a caption: "Doing medical volunteer work in South America motivated Zuleima to earn her degree in physical therapy to help people in need."

Supermarkets and Wal-Mart stores are displaying a freestanding poster in Spanish and English showing Hidalgo and her mother with a mockup of the scholarship check. Posters of the 2011 scholarship winners are also at Target stores and gas stations, and Hidalgo and the other scholarship winners were featured in a Dr Pepper commercial running on ESPN through Nov. 15.

"It is truly a blessing," she said. "Winning this Dr Pepper scholarship has provided me with a network of professionals who always look out for me."

In the 60-second video Hidalgo made last year for the contest, she said, "I made a pledge to my mother that I would return to Colombia, her home country, and help my family members, who are in desperate need of physical therapy."

Hidalgo's video includes a humorous scenario (about a physical therapy "patient" who takes a sip of the soft drink and immediately regains full use of her limbs), as well as personal moments from her life: her proud mother on graduation day, her USC acceptance envelope and one of the relatives in Colombia whom she hopes to help when she receives her degree.



PT student Zuleima B. Hidalgo appears on a can of Dr Pepper after winning a scholarship competition sponsored by the soft drink company. She won a \$7,500 prize with a humorous 60-second video she created.

The Doctor of Physical Therapy (DPT) program at USC prepares students to be authoritative practitioners in the diagnosis and treatment of movement dysfunction.

DRILL: Campus practices for disaster

Continued from page 1

thing he learned from the drill was that an emergency can challenge one to assume a variety of roles. He would usually be part of the entry team going into buildings to assess safety issues, but, on this day, circumstances had him acting as safety officer. "Don't just come in thinking that you're going to wear just one hat," he said.

Robert Vance, emergency management officer for the USC hospitals, said he was extremely pleased with the results of exercise.

"There were six major objectives as measurements, and most of those objectives were met," said Vance. "We also discovered several areas for improvement, which is always a goal. I would much rather find those areas now than during an actual disaster."

Vance added that the exercise provided the opportunity to discover how shared resources and communication between the Health Sciences and University Park campuses might function during an actual disaster. Results are being compiled and will be submitted, along with feedback from an online survey, to the Emergency Management Committee for follow-up.

The Weekly NEWSMAKERS

A Nov. 26 article in *U.S. News & World Report* cited a study led by **Heather Volk**, assistant professor of preventive medicine at the Keck School of Medicine of USC, finding that exposure to traffic-related air pollution during pregnancy, or the first year of a child's life, has been linked to autism.

A Nov. 26 post on KPCC-FM features a photo of neurosurgeon **Gabriel Zada**, assistant professor of neurological surgery at the Keck School.

On Nov. 23, *The New York Times* ran an op-ed written by **Dana Goldman** of the USC School of Pharmacy and USC Price School. Goldman and colleagues wrote that the health insurance exchanges created by the Affordable

Care Act may be too small to be successful.

"Greater competition in the insurance industry—either through health insurance exchanges or other measures—may not lower insurance premiums," they wrote. "Weakening insurers' bargaining power could instead translate into higher costs for all of us in the form of higher premiums."

A Nov. 22 report on FedSmith.com noted that **David Agus**, professor of medicine at the Keck School, is an oncologist at USC.

A Nov. 20 article in the *Jewish Journal* reported that entertainment lawyer Ken Kleinberg, founder of the University Kidney Research Organization,

partnered with the Keck School and **Vito Campese**, professor of medicine and chief of the division of nephrology and hypertension, to establish the USC/UKRO Kidney Research Center.

A Nov. 20 article in *South China Morning Post* (China) covered research by Keck School doctoral student **Chelsea Catsburg** finding that dietary protein and dietary iron—both of which are found in red meat—may combine to form carcinogens that can increase the risk of bladder cancer. The findings further support recommendations to limit red meat consumption and avoid processed meats.

A Nov. 20 article in *New Parent* magazine quoted **Mona Patel**, instructor of

clinical pediatrics at the Keck School, about safer remedies for coughing babies and toddlers.

A Nov. 19 broadcast on ABC News Los Angeles affiliate KABC-TV interviewed **Tracy Zaslow**, assistant professor of clinical orthopaedics at the Keck School, about warning signs of student-athlete concussions. ABC News Los Angeles affiliate KABC-TV also interviewed Zaslow for a story about child athletes at risk of overuse injuries.

A Nov. 12 broadcast of "The Doctors" cited a study led by **Victoria Cortessis**, assistant professor of preventive medicine at the Keck School, which found a link between marijuana use and testicular cancer.

Calendar of Events

This Calendar of Events is also online at www.usc.edu/hscalendar for the Health Sciences campus community

Saturday, Dec. 1

8:30 a.m. – 1 p.m. 20th Annual Parkinson's Update. Various speakers. Hilton Pasadena. Info: (323) 442-5728

Tuesday, Dec. 4

Noon. Cancer Center Grand Rounds. "Melanoma, Tumorigenesis and Metastasis," Sean Morrison, UT Southwestern Univ. NRT Aresty Auditorium. Info: (323) 865-0801

Noon. Psychiatry Grand Rounds. "Globesity and Food as an Addiction," Mark Gold, University of Florida. ZNI 112. Info: (323) 442-4065

Wednesday, Dec. 5

4 p.m. Keck School of Medicine of USC and Children's Hospital Los Angeles Town Hall meeting hosted by Dean Carmen A. Puliafito. CHLA Saban Auditorium. Holiday reception immediately following. Info: (323) 442-3163

Thursday, Dec. 6

Noon. USC Research Center for Liver Diseases Seminar. "A Systems Biology Approach to Alcoholic Liver Disease," Craig McClain, University of Louisville. HMR 100. Info: (323) 442-1283

Noon. USC Global Health Conference. "Do the Facts Speak for Themselves? Testing the Effectiveness of Story- and Fact-based Cervical Cancer Messages for Latinas," Lourdes Baezconde-Garbanati, Doe Mayer, Sheila Murphy, USC. TCC 227. Info: (323) 865-0127

Friday, Dec. 7

Noon. Medicine Grand Rounds. "Non-Cirrhotic Portal Hypertension," Hazel Abinsay, USC. IPT Conference Room B. Info: (323) 226-7556

Noon. USC School of Pharmacy seminar. "Prostate Cancer – Models and Mechanisms," Sarki Abdulkadir, Vanderbilt. PSC 104. Info: (323) 442-2341

Tuesday, Dec. 11

10:30 a.m. Keck Hospital of USC Guild Speaker Series. "Healing Broken Hearts," Michael Bowdish, USC. DOH 100. Info and reservations: (323) 254-0922

Noon. Psychiatry Grand Rounds. "Burnout Among Pediatricians and Psychiatrists at LAC," Torang Sepah, USC. ZNI 112. Info: (323) 442-4065

Noon. Cancer Center Grand Rounds. "Post-Mastectomy Radiation Therapy: Ongoing Controversies, Emerging Techniques and Patient Decisions," Reshma Jagsi, University of Michigan. NRT Aresty Auditorium. Info: (323) 865-0801

Wednesday, Dec. 12

6:30 p.m. University Kidney Research Organization Benefit Dinner. Honorees: Patrick Haden, USC; Camila Koenig and Family; The Erich and Della Koenig Foundation; Paul Terasaki, UCLA. Special performance by Natalie Cole. Beverly Hilton Hotel, Beverly Hills. Info: (323) 314-7000

Thursday, Dec. 13

Noon. 4th Annual Telfer B. "Pete" Reynolds Memorial Lecture. "Emerging Concepts in the Diagnosis, Pathogenesis and Management of Autoimmune Hepatitis," Albert Czaja, Mayo Clinic. HMR 100. Info: (323) 442-1283

5:30 p.m. Orthopaedic Grand Rounds. "Treatment of Spinal Conditions in the High-Performance Athlete," Wellington Hsu, Northwestern University. NRT Aresty Auditorium. Info: (323) 226-7204

Notice: Deadline for calendar submission is 4 p.m. Monday to be considered for that week's issue—although three weeks' advance notice of events is recommended. Please note that timely submission does not guarantee an item will be printed. Send calendar items to *The Weekly*, KAM 400 or fax to (323) 442-2832, or email to eblaauw@usc.edu. Entries must include day, date, time, title of talk, first and last name of speaker, affiliation of speaker, location and a phone number for information.

California children more likely to be uninsured than elsewhere in the U.S., USC analysis shows

By Alison Trinidad

A recent USC-led study shows that compared to the nation, a higher proportion of children in California are uninsured, one in every 10 children or more than 1.1 million in 2011.

Further, more of California's children have public health insurance and fewer have insurance through their parents' employer.

Over the past three years, a decade of advances in California children's public insurance enrollment has stalled, as coverage in Healthy Families (California's children's health insurance program) declined as a result of reductions in state government funding.

These are just a few of the findings in a new report from the California HealthCare Foundation developed by the Keck School of Medicine of USC and Diringer and Associates that provides an overview of trends in children's health insurance coverage and insurance programs in the state.

Other findings include:

California's proportion of children without health coverage is higher than the national average and most other states. Nevada

has the highest proportion of uninsured children and Massachusetts has the lowest.

Of California residents aged 18 or younger, 56 percent had private insurance, 38 percent had Medi-Cal (the state's Medicaid program, which provides health coverage for people with low incomes) or Healthy Families, and 11 percent were uninsured in 2011.

Public coverage through Medi-Cal and Healthy Families expanded 46 percent from 2002 to 2011, while employer-based coverage declined by 16 percent.

Medi-Cal continues to fill the gap in coverage created by the decline in private insurance. In 2011, almost 3.7 million children were enrolled, up from about 2.6 million in 2001.

Uninsured children are far more likely than those with coverage to have needed care delayed or to not receive care.

"Our findings have direct relevance to the health reform issues covered during the Presidential campaign," said Michael Cousineau, lead author of the report and associate professor in the departments of family medicine and preventive medicine at the Keck School.

"With full implementation of the new Patient Protection and Affordable Care Act more certain, there are new opportunities for many of these children to gain coverage and, more importantly, access to care including immunizations, annual checkups, and care for acute and chronic health problems. Even children of some small business employees might benefit since small employers are eligible for a subsidy to help provide insurance for their employees and their families."

As many as 1 million uninsured children may be eligible for Medi-Cal or private coverage through the new California Health Benefits Exchange. Not all children will be covered, however—undocumented immigrant children will not be eligible and will have to rely on safety net clinics and public hospitals such as the Los Angeles County+USC Medical Center for care.

The report was published as part of the California HealthCare Foundation's California Health Care Almanac, an online clearinghouse for key data and analysis examining California's medical system.

SC CTSI opens new Clinical Trials Unit at Health Sciences campus

The Southern California Clinical and Translational Science Institute (SC CTSI) has relocated its Clinical Trials Unit (CTU) to the USC Norris Cancer Hospital.

The CTU, which offers infrastructure, resources and support for investigators to conduct human studies, is now located on the fourth floor of the Ezralow Tower and is furnished with the latest equipment.

Yolanda Stewart, assistant director for clinical operations at the CTU, said the new location would offer investigators and research participants with a great space to conduct human studies and additional qualified personnel to support them.

Concurrent with the move, Program Director Anthony El-Khoueiry has filled two key leadership roles to further develop and expand the CTU capabilities and services. Maria Apkarian, director of operations, comes with more than 10 years of site manage-

ment and industry experience. Aura Marroquin has been promoted to clinical research nurse manager.

Under the banner Translating Science into Solutions

for Better Health, the SC CTSI provides infrastructure, services and training to support clinical and translational research. Learn more at scctsi.org.

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