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Provided by Lisa Rutledge and Seth Ruffins

An image of kidneys from the OPT microscope built by engineering students at USC.

Engineering undergrads focus on microscope for stem cell center

By Cristy Lytal

When Andy McMahon, head of USC Stem Cell, wanted a three-dimensional image of a kidney, he used to ship the organ to Australia. Now he can just send down the hall to the university's new specialized microscope — built by five undergraduates from the USC Viterbi School of Engineering for ENGR 499 Microscope Design and Construction.

Called an optical projection tomography (OPT) microscope, the instrument produces 3-D images of pea-sized biological samples such as organs and embryos. This provides a valuable tool that enables McMahon and other biologists to study how organs develop and how they maintain and repair themselves.

"To acquire an OPT image, light is either projected through the specimen or the specimen is illuminated for fluorescent imaging. Then a camera captures images at 1,000 different angles all the way around the specimen," said Seth Ruffins, PhD, who taught the course and directs the Microscopy Core Facility at the Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at USC. "And through a mathematical process called a back plane projection you can then construct those images from all these different angles into a three-dimensional shape."

With funding secured by McMahon and input from USC Viterbi Professor Andrea Armani, PhD, and Provost Professor Scott E. Fraser, PhD, the undergraduates built and assembled the microscope hardware in ENGR 499 during the fall 2014 semester. They continued to troubleshoot the software as volunteers during spring 2015. Chao-Yuan "Joe" Yeh, a graduate student in the lab of Cheng Ming-Chuong at the Keck School of Medicine of USC, further refined the instrument control software.

The microscope began capturing its first state-of-the-art images, including a detailed three-dimensional rendering of kidneys and lungs.

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New students enter medicine — and get a white coat to prove it

By Hope Hamashige

In an annual ritual that is both celebratory and serious, 187 new students at the Keck School of Medicine of USC received their white coats, symbolizing entrance into the medical profession.

They were part of a ritual that is duplicated at other USC medical-related schools, including the USC School of Pharmacy and the USC Ostrow School of Dentistry, and at more than 100 other medical institutions in the United States.

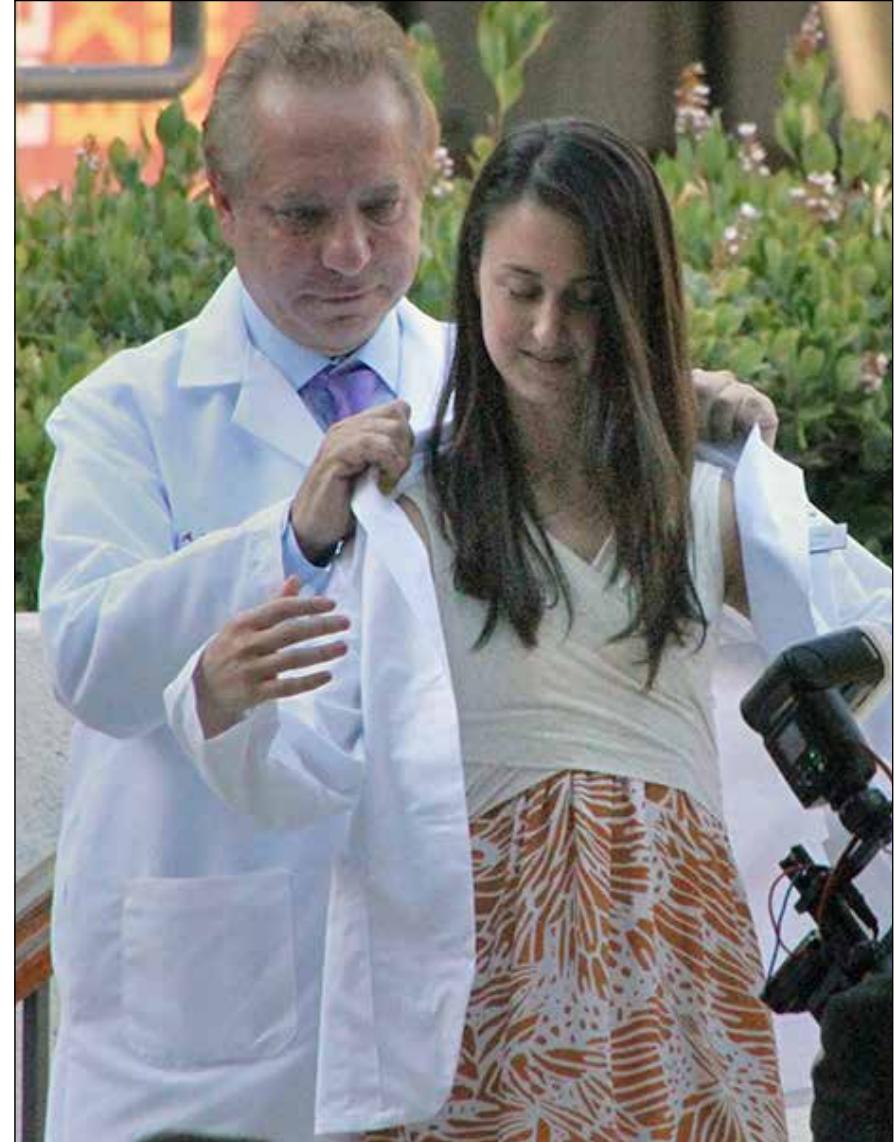
The Keck School students were officially welcomed by Dean Carmen A. Puliafito, MD, MBA, who noted that their achievements as undergraduates landed them spots at one of the elite medical schools in the United States.

Quoting Sir William Osler, a Canadian physician and one of the four founding professors of Johns Hopkins Hospital, Puliafito said: "The practice of medicine is an art, not a trade; a calling, not a business; a calling in which your heart will be exercised equally with your head."

Puliafito's remarks set the tone Aug. 14 on a hot afternoon on the Health Sciences Campus, where speakers reminded the students that practicing medicine requires a mix of deep scientific knowledge and deep compassion for people.

Henri Ford, MD, MHA, vice dean for medical education at the Keck School, pointed out that first-year students sometimes struggle to make

See **CEREMONY**, page 3



Dean Carmen A. Puliafito helps student physician Roxane Fries don her white coat.

Douglas Morino

Anthology of student work reflects Hippocratic Oath

By Douglas Morino

Personal oaths interpreting the original Hippocratic oath have been crafted by current and former Keck students over the past seven years. A representative sample of these oaths has been compiled in a new book published by University of California Medical Humanities Press.

These are personal vows dedicated to upholding the foundations that medicine is built upon — compassion, knowledge, empathy and a commitment to benefit patients' lives.

Hippocrates Revisited: A Collection of Personal Student Oaths is curated by Keck School of Medicine faculty members Jo Marie Reilly, MD, Allan S. Lichtman, MD, Rosemary R. Lichtman, PhD, and third-year medical student Helena Yu.

The works celebrate values held by students during their journey through medical school and into their careers, Reilly said.

"Medicine is a science and an art," said Reilly, an associate professor of clinical family medicine and associate director of the Introduction to Clinical Medicine Program. "This anthology reflects the art of medicine. The oaths represent creatively the themes that students are struggling with and celebrating as they begin their journey in the medical profession."

The vows come in many forms — photo collages, musical scores, poems, personal essays — and are based on the Hippocratic Oath, a rite



Incoming Keck Medical School of USC students recite the Hippocratic Oath on Aug. 14.

Douglas Morino

of passage signaling the transition of medical students into physicians that is considered among the most sacred binding documents in history.

Named after Hippocrates, the oath lays a foundation for the practice of ethical medicine by touching on themes of knowledge, compassion, empathy and fortitude in the face of adversity.

Students recite the Hippocratic oath before the ceremony at which they receive their white coats at the start of medical school, promising to practice medicine with honor, loyalty and professionalism. Then they are assigned to compose their own personal oaths in the Professionalism and

Practice of Medicine course required of all Keck first-year students.

"Students haven't had any tests or hard work yet, so it's an honest and thoughtful opportunity to reflect on what it means for their life," Reilly said. "The oaths become something they refer back to and keep. It's very positive for them."

Students at the Keck School have been crafting their own personal oaths for about seven years, and Reilly shares her own oath with them at the start of each semester. The assignment stemmed from Reilly's personal journey as a practicing physician.

"I had been in practice for about

See **OATH**, page 3

Merkin Family Foundation provides regenerative medicine faculty posts

By Cristy Lytal

In the past two years, USC's Department of Stem Cell Biology and Regenerative Medicine has welcomed six new assistant professors — and, thanks to a gift from the Merkin Family Foundation, four more are on the horizon.

The young faculty members are recipients of the Richard N. Merkin Assistant Professorships in Regenerative Medicine, funded through the Richard N. Merkin, MD, Fund for Professorships in Regenerative Medicine. The gift enables USC to retain outstanding young faculty members and provide them with career-shaping resources to support their efforts to obtain external funding and tenure-track success as they transition to the next phase of their careers.

"This gift supports USC's progress in assembling and cultivating one of the most dynamic teams of research scientists in the field of

regenerative medicine," said Andy McMahon, PhD, FRS, chair of the Department of Stem Cell Biology and Regenerative Medicine. "I am confident that these faculty will make transformational contributions to human health in the years to come."

In addition to the recognition as assistant professors, each awardee will receive three years of support and training. They also receive access to a unique fund dedicated to promoting collaborations with clinicians in order to propel laboratory research into the patient-care setting.

"I'm delighted to establish the Merkin Fund for Professorships in Regenerative Medicine at the Keck School of Medicine of USC

to further support research and discoveries that can unlock debilitating chronic diseases and develop new therapies," said Richard N. Merkin, MD, president and CEO of Heritage Provider Network and the Merkin



Family Foundation. Merkin is also a member of the Board of Overseers of the Keck School of Medicine of USC. The Heritage Provider Network and its affiliates operate in California, New York and Arizona, providing high-quality, cost-effective health care to more than 700,000 individuals.

Merkin added, "Successful research can play an integral role in overcoming barriers for millions of Americans suffering from nerve disease and diabetes, and perhaps in solving some of the mysteries surrounding Alzheimer's disease as well."

MICROSCOPE: Interdisciplinary effort pays off

Continued from page 1

"This is probably only the fourth or fifth microscope of this design built in the United States," said Rufins. "This particular design comes from a group in Toronto [that] built it as an open source project."

Even with those designs in hand, the process of building the OPT microscope presented unexpected challenges.

"It wasn't a step-by-step blueprint at all, so we had to fill in the gaps and a lot of blanks there," said Stephanie Fong, a biomedical engineering major with a digital studies minor. "So, in a sense, this was more representative of the real world than a classroom situation. It was really just jumping in and getting hands-on right away with very little prior knowledge."

Biomedical engineering major Dinesh Seemakurty added: "It shows you that, even with a plan, it's still

very difficult to make something happen. There are bugs, or there's something that goes wrong. And no one actually has documented how you solve that, so you end up having to figure that part out."

The students did everything from machining the parts to building the microscope's computer, plus assembling the components and programming software.

Beibo Zhao, a biomedical engineering major with a statistics minor, said, "You have to get your hands dirty to learn to make a computer. So that's something very valuable."

The hands-on nature of the course taught the students a great deal in a short time. They had to work as a team to solve a real-world problem on a tight deadline.

"We're all biomedical engineers, but we all have different strengths," said Kathleen Roche, a biomedical engineering major with

a French minor. "In most of our classes, we don't really get the chance to build a machine, especially something as complicated as this from the ground up, so it's been a really cool experience."

McMahon, PhD, the director of the Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at USC, will continue to cultivate collaboration and interdisciplinary thinking through the university-wide USC Stem Cell initiative, which connects almost 100 researchers.

"I look forward to continuing to work with students and colleagues at USC Viterbi and across the university," he said. "The fact that this undergraduate course has produced a working OPT microscope, which will be tremendously useful to stem cell researchers including myself, underscores the synergy that results when we reach across disciplines."

Calendar of Events

Tuesday, Sept. 1

11 a.m. USC Stem Cell Seminar. Markus Grompe, Oregon Health and Science University. Eli and Edythe Broad CIRM Center Auditorium. Info: Cristy Lytal, (323) 442-2172, lytal@med.usc.edu

5:30 p.m. Ophthalmology Grand Rounds. Billy Pan, MD, USC. HC4 Conference Room, 3rd Floor. Info: Tyasha Christopher, (323) 409-5233. Tyasha.Christopher@med.usc.edu

Wednesday, Sept. 2

Noon. Saban Research Institute Seminar. "NK Cell Therapy for Pediatric Cancers," Dean A. Lee, MD, PhD, University of Texas. Auditorium, Saban Building, 4661 Sunset Blvd., Los Angeles. Parking is available at the main hospital garage. Info:

tecpad@chla.usc.edu, http://chla.org/tecpad

Tuesday, Sept. 8

11 a.m. USC Stem Cell Seminar. Sean Morrison, University of Texas Southwestern Medical Center. Eli and Edythe Broad CIRM Center Auditorium. Info: Cristy Lytal, (323) 442-2172, lytal@med.usc.edu, http://stemcell.usc.edu

Thursday, Sept. 10

1:30 p.m. Keck Medicine of USC Stroke Support Group Meeting. "Depression and Stroke," May Kim-Tenser, MD, USC. Keck Hospital, 3 North, Day Room (3261A). Parking validated and snacks provided. Info: Ozzy Obiwuru, (323) 442-0049, obiwuru@med.usc.edu

6 p.m. Department of Orthopaedic Surgery

Grand Rounds. "19th Annual Robert K. Kerlan, MD, Memorial Lecture," James H. Lubowitz, Taos Orthopaedic Surgery. Mayer Auditorium. Info and RSVP (by Sept. 2): Sylvia Suarez, (323) 226-7204, sylsua@usc.edu

Saturday, Sept. 12

10 a.m. USC Caruso Department of Otolaryngology-Head and Neck Surgery. "Laryngectomy Support Group," Silver Conference Room. Group to meet second Saturday of each month in the same location. Info: Brenda Villegas, (323) 442-5790, Brenda.Villegas@med.usc.edu

Monday, Sept. 14

Noon. KSOM Research Seminar Series Seminar. "PET Molecular Imaging Assays in Drug Discovery and Development,"

Michael E. Phelps, PhD, UCLA. Aresty Auditorium. Info: Mary Jane Chua, (323) 442-7732, maryjane.chua@med.usc.edu

Tuesday, Sept. 15

11 a.m. USC Stem Cell Seminar. Adam Engler, UC San Diego. Eli and Edythe Broad CIRM Center Auditorium. Info: Cristy Lytal, (323) 442-2172, lytal@med.usc.edu

Thursday, Sept. 17

7 a.m. Division of Vascular Surgery and Endovascular Therapy, with the USC Office of Continuing Medical Education. "19th annual Max R. Gaspar Symposium: Contemporary Management of Challenging Vascular Conditions," Fred A. Weaver, MD. Millennium Biltmore Hotel, 506 S. Grand Ave., Los Angeles. Info: Teresa Ball, (323) 442-2555, usccme@usc.edu

Summer stem cell program benefits high school students

By Marie Rippet

Enthusiastic is the word that best describes the 10 students from this year's USC Early Investigator High School (EiHS) Stem Cell Research Program, who graduated July 31 from the summer laboratory immersion program at the Eli and Edythe Broad Center for Regenerative Medicine and Stem Cell Research at USC.

Since 2012, the program has enabled more than 50 students from local high schools to work in stem cell laboratories and take hands-on courses at the USC facility. This year's students hailed from Cupertino High School, Fairfax High School, Harvard-Westlake School, Lifeline Education Charter School, Milken Community Schools, Palos Verdes Peninsula High School and San Marino High School. The program was opened this year for students from any high school, said Kanomi Sasaki-Capela, the training coordinator at the USC Stem Cell Core Facility.

For the first hour of the graduation ceremony, students exhibited posters that



receive plaques commemorating their accomplishments.

Many laboratory mentors attended to support and brag about the students they had advised.

"Jonathan was very responsible," said postdoctoral researcher Susanna Cavaliero, who mentored Jonathan Kay of San Marino High School. "He was a pleasure to have in the lab — plus, most of his experiments worked."

The students had positive things to say about their experiences with EiHS.

"I enjoyed the weekly forums with Dr. Fox," said Sharon Chow, a student from Harvard-Westlake School. "She asked each of us what we were working on so we all could hear about each other's projects."

Esmeralda Lorenzana, a student from Lifeline Education Charter School, added, "It was also interesting to hear from professionals in different science-related careers."

Will these students pursue careers in science?

The response was an enthusiastic "yes."

Aspiring scientists from local high schools chat with family, friends and professors during a graduation ceremony held July 31 for the USC Early Investigator High School (EiHS) Stem Cell Research Program.

summarized their research for family, friends and peers. Topics included gene editing, neural stem cells and heart regeneration.

To begin the formal

graduation ceremony, members of the USC Stem Cell and EiHS communities spoke, thanking parents, professors, USC Stem Cell Core Facility members and

students themselves. As the students' names were called, they crossed to the front of the room to shake hands with Core Program Director Victoria Fox, PhD, and re-

OATH: Book collects students' pledges

Continued from page 1

10 years," she said. "It gets busy and it gets crazy. You think, 'Why am I doing all this?' You can get in an overwhelmed state. You have to sit down and remember why you started."

The oaths were submitted by 76 authors. Many of the oaths are done by former students who have gone on to become practicing physicians.

"What we read were very inspirational and positive, in a world that may not be so positive for us these days," Allan Lichtman said. "We felt that these oaths should be published to reveal the dedication and inspiration that our first-year students demonstrated."

The anthology was made possible by grants from the Arnold P. Gold Foundation and the USC Levan Institute for Humanities and Ethics. After being published in May, the anthology was distributed to all new graduates and to those who submitted oaths that were published.

"We hope to share the value of professionalism in medicine, and we believe this project will continue to remind and inspire students to keep humanity in patient care at the core of their practice of medicine," Yu said. "As my classmates and I move through the clinical years of medical school into residency and beyond, I hope this anthology will continue to be an encouraging and motivational reminder of our reasons for pursuing a



New students Gurleen Chadha and Kevin Carter recited their oaths Aug. 14 at the Keck School of Medicine of USC.

career in medicine."

The personal oaths are aimed at inspiring everyone from prospective medical students to those who have long completed medical school and are now practicing medicine.

"For me, reading these oaths continues to be an affirmation of hope," Reilly said. "As you get out and practice, you see a lot of things and your work can be challenging. These oaths remind you of why you started, who you are and where you have been. They inspire students and let them know this is a great career and a wonderful profession of service. From the days of Hippocrates it was, and it still is now."

Hippocrates Revisited: A Collection of Personal Student Oaths can be purchased at the USC Bookstore on the Health Sciences Campus and at amazon.com. The book is also available through the UC Medical Humanities Press.



Student physicians Detti Belina, Antonio Hernandez Saenz, Jean-Christophe Rwigema and David Lam were among those receiving white coats at the ceremony for new students at the Keck School of Medicine of USC.

CEREMONY: Ritual honors incoming class

Continued from page 1

a difficult diagnosis or create the best treatment plan, but that doesn't mean they can't help their patients.

"Your presence, your sensitivity, your caring attitude, your willingness to listen to them may have profound effects on their emotional well-being," Ford said. "Yes, you can make a difference even now."

This year's keynote speaker was Peter Crookes, MD, associate professor of

surgery and recipient of the 2015 Leonard Tow Humanism in Medicine Award.

Crookes echoed the theme, emphasizing that top medical practitioners combine sophisticated science with a genuine concern for others.

Students' time in medical school will focus on learning about scientific discoveries and technological advances, Crookes said, adding that it is just as important to remember the human side of medicine.

"Don't lose the human aspect of reaching out to people in distress," he said.

Cheers erupted as Puliafito and Ford cloaked the students in their coats — names emblazoned on the front — as each person was introduced to the crowd. Then the students recited the Hippocratic oath for the first time, swearing an allegiance to practice medicine with utmost integrity and with respect for the people they treat.



Student physician Nana-Yaw Bonsu wears his new white coat as he gathers with family after the ceremony.

Douglas Morino

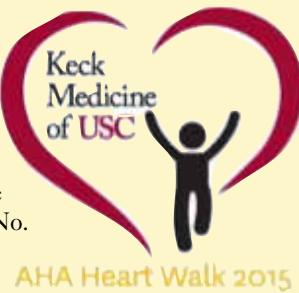
Douglas Morino

HSC Newsmakers

A roundup of news items related to Keck Medicine of USC, which may include philanthropic donations, research grants, publication in academic journals and mentions in the news media:

Walk with USC colleagues Sept. 26

KECK MEDICINE OF USC is a sponsor of this year's American Heart Association Heart Walk at the Rose Bowl on Sept. 26. The Heart Walk is the American Heart Association's premier event to raise funds and save lives from the No. 1 and No. 5 medical killers in the United States — heart disease and stroke. Walking teams are forming now. Sign up a team or register to walk by contacting Anne McGilvray at anne.mcgilvray@med.usc.



AHA Heart Walk 2015

New research program studies gut bacteria related to human disease

USC has funded a new intercampus research program to study the human microbiome and its impact on disease, the first such program at the university. The human body contains more than 100 trillion microbes known collectively as the microbiome. While the microbiome's importance in health has been noted — think probiotics and stool transplants — the role that these bacteria play in disease is still not well understood. Led by William DePaolo, PhD, associate director of USC's Programs in Biomedical and Biological Sciences (PIBBS), the Committee on Microbiome-Host Interactions in Disease (CMHID) aims to leverage existing technology at USC to drive bench-to-bedside research on the microbiome. The focus is on diseases such as inflammatory bowel disease, vaginal and gastrointestinal cancers, and metabolic disease. Involving more than 25 faculty from the Keck School of Medicine, the Roski School of Fine Arts and the School of Cinematic Arts, the committee was established by a three-year USC Research Collaboration Fund. For more, go to <http://www.cmhid.org>. — Alison Trinidad



Gaston Mantero, Branch Productions

White House honors IGM Gallery

Members of the advisory council for the USC Institute for Genetic Medicine Art Gallery and community leaders recently attended a gala to celebrate an award for volunteerism presented by the White House to IGM Gallery Director Lynn Crandall. The award and a letter signed by President Barack Obama were presented to Crandall by Jennifer Morgan, president of the United Nations Association, Beverly Hills, in recognition of the mission of the IGM Art Gallery and its public, private, nonprofit, faith-based, academic and media partners to develop economic self-sufficiency and social justice on both USC campuses and in the surrounding communities. The event also launched an exhibition by New Delhi artist Nikki Anand, who flew in for the reception and discussions led by speakers that included Jim Beddows of the Palo Alto Research Center (PARC) and Terance Wolfe of the USC Marshall School of Business.

Research shows teens who use e-cigarettes may go on to tobacco

A MULTI-UNIVERSITY TEAM LED by Keck Medicine of USC researchers has found, for the first time, that using electronic cigarettes, or "vaping," is associated with a propensity to start smoking cigarettes or use other tobacco products. Based on a survey of 2,530 14-year-olds at 10 public high schools in Los Angeles, the team found that teens who use e-cigarettes were more likely to transition to smokeable tobacco products. The findings were published Aug. 18 in the *Journal of the American Medical Association*. "E-cigarettes may be drawing a new generation of teens into recreational nicotine use because they are high-tech, can be purchased somewhat easily, come in enticing flavors and have a perception that they're not harmful," said Adam Leventhal, PhD, associate professor and director of the USC Health, Emotion and Addiction Laboratory at the Keck School of Medicine. The research is among the first to be released under an NIH-funded program established in 2013 at the Department of Preventive Medicine.

Cancer program at USC Norris honors Ronnie Lippin

By Hope Hamashige

His experience with the diagnosis and treatment of his wife's breast cancer has inspired Dick Lippin to establish the Ronnie Lippin Cancer Support and Navigation Program at the USC Norris Comprehensive Cancer Center.

Beginning this fall, the program will help people living near the Health Sciences Campus to maximize their chances of surviving cancer by getting them to the right doctors. It will also help them in understanding treatment options, clarifying insurance benefits and finding additional resources.

Before Ronnie Lippin developed a rare form of breast cancer, the couple had high-flying careers in the entertainment industry. Ronnie Lippin represented top names in music such as Eric Clapton, Prince, Brian Wilson and the Bee Gees. Dick Lippin represented Hollywood companies as clients of his public relations firm, the Lippin Group.

Despite their success in business, dealing with Ronnie Lippin's cancer made Dick Lippin feel "like a



Ronnie Lippin

babe in the woods."

"I was so sure of decisions I made in business, but when it came to complex medical information, I felt like I didn't know what I was doing," Dick Lippin said. "I remember thinking that if I was going through all this, I couldn't imagine what people who couldn't afford great care were going through."

After Ronnie's death, Dick Lippin partnered with Tower Cancer Research Foundation.

He explained the type of program he envisioned to honor his wife's memory and they steered him toward a \$300,000 donation to establish the program at USC Norris. Linda David, executive director of Tower Cancer Research Foundation, explained that the organization works with its donors to find the right institution in Southern California for the kind of donation they want to make.

"He is passionate about getting help for people who

don't have access to the best care or the understanding of the system to get the help they need," David said.

Lippin came to her unsure where his money would do the most good. She knew that Keck Medicine physicians do free cancer screenings in the communities around the campus, where there are high instances of late-stage cancer diagnoses, and she saw a fit. "A lot of those people who get a cancer diagnosis will benefit from someone stepping in to help them navigate their next steps," she said.

Zul Surani, executive director of HSC Community Partnerships, explained that USC Norris had identified a need to bridge the gap between the free cancer screenings in the neighborhoods and ensuring those people get the help they need.

"We don't want the people we screen and who need follow-up services to fall through the cracks," Surani said. "We are so grateful for this gift because we think it will help us fulfill our mission of promoting better health in the community we serve."

Global study of Type 1 diabetes receives funds

By Hope Hamashige

Two USC research leaders recently received funding to participate in a global effort to find new ways to prevent the onset of Type 1 diabetes (T1D).

David Agus, MD, professor of medicine, and Dan Ruderman, PhD, assistant professor of research medicine, were awarded \$169,806 by the Leona M. and Harry B. Helmsley Charitable Trust. The project, dubbed the T1D Prevention Initiative, involves ongoing and new research at five institutions — Helmholtz Zentrum Munchen in Germany, the University of Cambridge in Great Britain, JDRF in Australia and the Keck School of Medicine of USC and the University of South Florida in the United States.

The project's initial total investment of over \$8.7 million will help these institutions initiate and continue observation of hundreds of thousands of newborns and children across the U.S., Europe and Australia, as well as funding analysis of the data to chart the history and progression of Type 1 diabetes. Clinical trials seeking to halt the development of T1D are also expected.

In Type 1 diabetes, the body does not produce insulin. It is usually diagnosed in children and young adults, according to the American Diabetes Association.

Agus and his team are reviewing the availability and quality of existing clinical data from T1D trials and from trials of other autoimmune diseases. Their research will determine whether sufficient data exists to design an interventional prevention trial and to use data analytic techniques to better understand T1D and



David Agus, MD

other childhood diseases.

"My team and I are excited to dive into the clinical trial data and try to learn about the onset of diabetes," said Agus, who is also a professor in the USC Vit-

erbi School of Engineering. "Through the remarkable patients who donated their data, we will hopefully develop a new understanding to better prevent and treat T1D. This is the beginning of a long and fruitful collaboration with the Helmsley Trust to understand T1D and design clinical trials to make a difference in T1D and other diseases."

The Helmsley Charitable Trust supports research in the field of T1D understanding and prevention.

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