PRESENTED BY

USC Roski Eye Institute

Keck Medicine of USC

INSIGHT

2017 ANNUAL REPORT

KECK SCHOOL OF MEDICINE OF USC
DEPARTMENT OF OPHTHALMOLOGY

Edward and Gayle Roski share a lighthearted moment at the opening of the newly remodeled clinic that bears their name.

We are fortunate in the passion, quality, and inventiveness of our team. Together we are a community — working with patients, families, philanthropists, physicians, scientists, researchers, caregivers residents, technicians, entrepreneurs, managers, and many others.

None of this would have been possible without your support. We salute you and thank you!

VISION IS OUR MISSION

PRESERVE

The USC Roski Eye Institute diagnoses, treats and manages the most complex eye conditions, from *in utero* to advanced age.

PROTECT

The USC Roski Eye Institute leads major research in the epidemiology of eye disease to help prevent blindness.

RESTORE

The USC Roski Eye Institute integrates and applies emerging technologies to develop new methods to restore sight to the blind.

FULFILLMENT OF OUR MISSION IS BEST EXPRESSED IN THE REMARKABLE TRIUMPHS OF OUR PATIENTS. PLEASE READ THEIR STORIES IN THE PAGES AHEAD.

HIGHLY SPECIALIZED CARE FOR ADULTS & CHILDREN

The USC Roski Eye Institute treats the full spectrum of eye conditions — from the most common to the most complex.

- CATARACT
- CORNEA AND EXTERNAL DISEASES
- GLAUCOMA
- LASER VISION CORRECTION
- LOW VISION REHABILITATION
- NEURO-OPHTHALMOLOGY AND ADULT STRABISMUS
- OCULAR ONCOLOGY
- OCULOFACIAL PLASTIC SURGERY
- OPHTHALMIC MOLECULAR AND IMMUNOPATHOLOGY
- PEDIATRIC OPHTHALMOLOGY
- SPECIALTY CONTACT LENSES AND PROSE*
- UVEITIS AND OCULAR INFLAMMATION
- VITREORETINAL SURGERY AND RETINAL DISEASE

*USC Roski Eye Institute is the only PROSE location in California

MAJOR ACCOLADES AND ACHIEVEMENTS

SUPERDOCTORS®
SOUTHERN CALIFORNIA 2017
RISING STARS™ EDITION

7 USC Roski Eye Institute physicians were voted "rising stars" by their peers

NANOS YOUNG INVESTIGATOR AWARD

PRESENTED TO

KIMBERLY GOKOFFSKI, MD, PHD

TOP DOCTORS 2017

24 USC ROSKI EYE INSTITUTE PHYSICIANS WERE NAMED AMONG THE BEST

4 OF TOP 10 MOST TALKED ABOUT JAMA ARTICLES OF 2016

USC ROSKI EYE INSTITUTE PUBLISHED RESEARCH

#2

IN RESEARCH FUNDING 2015 AND 2016

by the National Eye Institute

NAI Fellowship Medallion

AWARDED TO

MARK S. HUMAYUN, MD, PHD

The nation's highest honor for technology achievement

(from left) Andrew H. Hirshfeld, U.S. Commissioner for Patents, Mark Humayun, MD, PhD, Paul R. Sanberg, President of NAI

UP AND COMERS POWER LIST 2017

AWARDED TO

AMIR KASHANI, MD, PHD

by The Ophthalmologist

REDUCING INFANT BLINDNESS
THROUGH INNOVATIVE TELEMEDICINE

Infants in Armenia are three times more likely to suffer blindness than those born in the United States. To preserve precious eyesight, Thomas C. Lee, MD, Director of the Vision Center at Children's Hospital Los Angeles, applies advanced technology to train Armenian surgeons remotely, in partnership with the Armenian Eye Care Project.

From his office 7,000 miles away, Lee views surgeries in real time, communicates face-to-face with surgeons, and shares medical files. Under Lee's leadership, Armenian eye surgeons are gaining the skills and building the confidence they need to save infants' vision.

Although Lee's technology partner, SADA Systems, won a Microsoft 2017 Health Innovation Award for its efforts, the true winners are Armenian infants who will grow up seeing the world of wonder around them.

The USC Roski Eye Institute is working toward the day when eye surgeons worldwide will have access to advanced training through telemedicine, so fewer infants will lose their eyesight.

DELIVERING CLINICAL BREAKTHROUGHS FROM LABORATORY TO PATIENT

The XEN gel stent is made of non-degradable soft collagen-derived gelatin. It conforms to eye tissue to effectively drain fluid and reduce eye pressure with less discomfort and fewer side effects than traditional procedures.

When Alena Reznik, MD, and Sahar Bedrood, MD, PhD, implanted the new XEN® gel stent, it was a triumph for glaucoma patients in Los Angeles County, and the final step on the path of innovation.

At the gel stent's inception, Rohit Varma, MD, MPH, advised AqueSys, Inc. on its design and application. The USC Roski Eye Institute conducted clinical trials, and analyzed data that demonstrated its effectiveness, leading to FDA approval. Finally, when XEN came on the market, Reznik and Bedrood were proud to be among the first to provide it to patients.

The minimally invasive, outpatient surgical option is a game changer for glaucoma patients whose intra-ocular pressure (IOP) cannot be managed by medications or laser treatment. It holds great promise for the nearly 70 billion people worldwide estimated to have glaucoma.

Maurice Randall

Advanced Primary Open-Angle Glaucoma and Cataracts in Both Eyes

OCULAR HISTORY

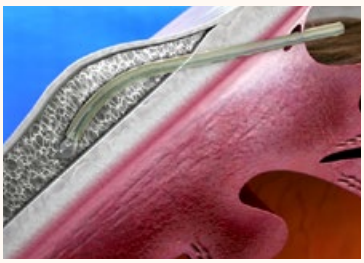
Presented with advanced peripheral vision loss and decreased vision in both eyes despite taking all available glaucoma medications.

TREATMENT

Underwent cataract extraction and iStent® placement in his left eye and cataract extraction with XEN® gel stent placement in his right eye.

OUTCOME

Eye pressure is well controlled, and vision is 20/20 in both eyes.



The iStent® Procedure involves implanting a tiny titanium device that reduces intraocular pressure by creating a bypass between the front part of the eye and its drainage pathway.

Charles Flowers, Jr., MD, left, and Alena Reznik, MD, right, worked together to provide comprehensive treatment of all Maurice's vision issues.

"The improvement in my vision is amazing. It changed my life." **Maurice Randall**

Maurice Randall suspected that his vision was getting worse. Sharon, his wife of 35 years, also noticed that something wasn't right, so Maurice had his eyes examined. He was diagnosed with glaucoma.

The Randalls decided to travel 115 miles from their home in Bakersfield to the USC Roski Eye Institute because of its excellent reputation. Charles Flowers, Jr., MD, and Alena Reznik, MD, determined that Maurice had glaucoma and cataracts in both eyes. They proposed a treatment plan that would greatly improve his vision. The Randalls agreed.

Dr. Flowers removed Maurice's cataracts and performed LASIK surgery. Dr. Reznik implanted specialized stents to decrease Maurice's eye pressure and reduce his dependence on daily eye drops. Maurice noticed a vast improvement in his vision just one day after the procedures. Now his eye pressure is under control and his vision is 20/20.

After more than 30 years as an accountant, Maurice recently joined his wife, a former school teacher, in retirement. They are planning to "see the world" together, and now can realize that dream more vividly.

Ruby Chan

> *"We have felt empowered from the very first appointment."* **Nellie Chan, Ruby's mother**

Ruby Chan was born prematurely and diagnosed with cancer in both of her eyes. At the time of Ruby's diagnosis she was barely three months old. Ruby's parents, Michael and Nellie, began their search for the perfect doctor, which led them to Jesse Berry, MD.

Retinoblastoma is diagnosed under five years of age, typically around 18 months. A third of the time it affects both eyes, which involves a genetic mutation. The unique element with Ruby's condition is that her premature birth allowed for an earlier diagnosis, enabling more vision to be saved. Ruby's parents knew that their daughter was in good hands right from the start. Jesse Berry, MD, created a customized treatment plan and made them feel right at home.

Dr. Berry performed three rounds of chemotherapy and multiple cycles of laser therapy to keep Ruby's tumors under control. She now has near-normal vision in both eyes, with a full recovery expected soon!

Ruby enjoys going to Disneyland and loves playing with Nemo. After three years, Ruby's parents are very much looking forward to officially saying 'cancer free' once and for all.

Bilateral Retinoblastoma

OCULAR HISTORY

Bilateral retinoblastoma, the right eye involves the macula.

TREATMENT

Chemotherapy and laser therapy every three to four weeks since birth.

OUTCOME

Both eyes stable and saved from cancer. She recently needed a few more sessions of laser therapy but has been stable since, looking forward to using the word 'cured' soon.

Ruby's right eye has limited vision but the tumor in the left spared the macula, she can see well in the left eye.

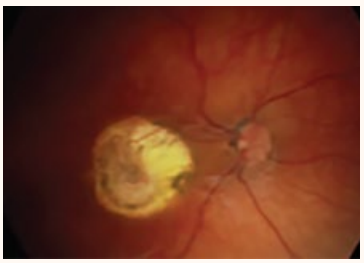
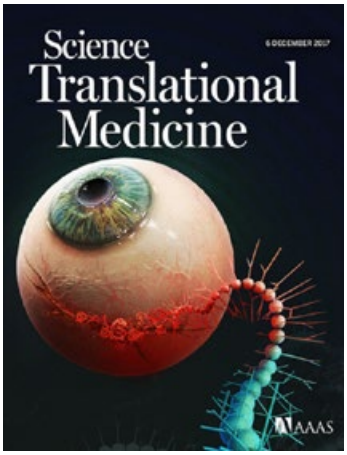


Image of the right eye shows a central scar involving the macula after laser consolidation for group B retinoblastoma, a new tumor adjacent to the nerve, which has now been treated.

Jesse Berry, MD, performed treatment to save both of Ruby's eyes from cancer.

COMBATING EYE INJURIES WITH A REVERSIBLE SUPERGLUE



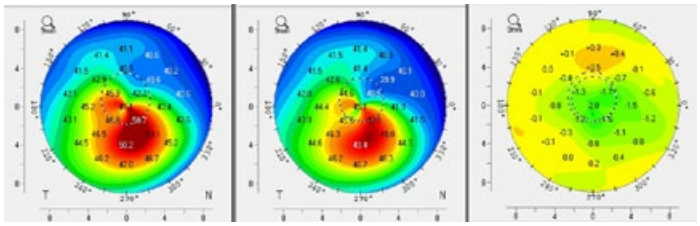
The hydrogel ocular patch is being developed to treat battlefield injuries resulting in laceration of all layers of eye tissue. Funded by the Department of Defense, research at the USC Roski Eye Institute recently marked an important milestone toward making this treatment a reality.

Jack Whalen, PhD, led a workshop in which 44 military ophthalmologists, medics and corpsmen tested the new technology in a laboratory model of severe ocular trauma. They provided valuable feedback that will be used to enhance the final design that will be accelerated toward clinical trials. The sealant for ocular trauma was recently published and featured on the cover of the prestigious Science and Translational Medicine journal.

The hydrogel patch is a major advance that promises to improve response to eye trauma, not only for military personnel, but also for anyone whose vision is threatened by serious injury.

A new hydrogel developed by researchers can treat patients in the field before they have access to a hospital.

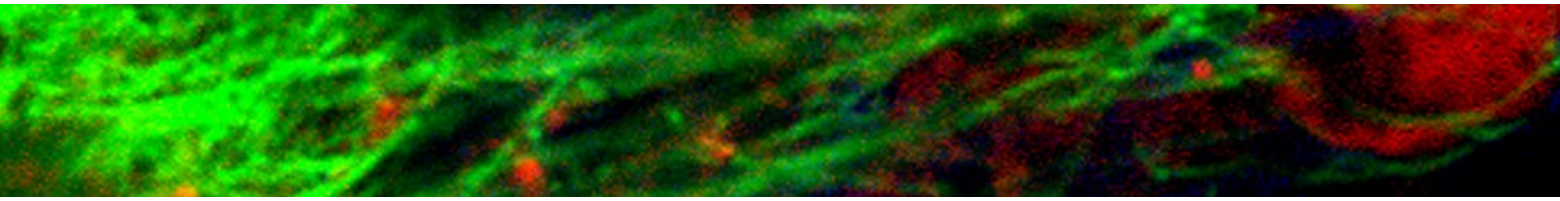
REVOLUTIONARY METHODS TO EVALUATE & IMPROVE TREATMENT



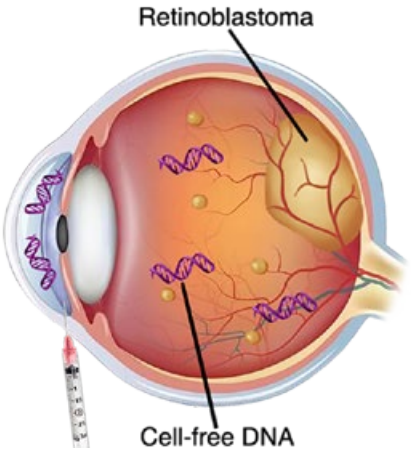
Brillouin microscopy measures the natural light scattering that occurs when the cornea continually adapts to subtle changes in temperature. This information is used to determine the mechanical properties of each cornea layer, essentially performing a fully noninvasive "biopsy" of the living cornea.

Do LASIK Xtra procedures protect patients from corneal-distorting disorders? The answer has been under debate. Recently USC Roski Eye Institute researchers provided new evidence that the procedure does not stiffen the cornea, and consequently does not provide protection.

While this finding has significant implications for patient care, how it was discovered is equally important. Researchers used Brillouin microscopy, a new method that can measure the strength of the cornea in patients without touching or disturbing it. Only three U.S. institutions have access to the method. One day Brillouin microscopy may allow physicians to create personalized treatment plans for more precise identification of cornea-distorting disorders with the goal of preventing corneal transplantation or even blindness from conditions such as keratoconus, congenital brittle cornea syndrome and pellucid marginal corneal degeneration.



DEVELOPING **ALTERNATIVE GENETIC ANALYSIS** FOR RETINOBLASTOMA TUMORS

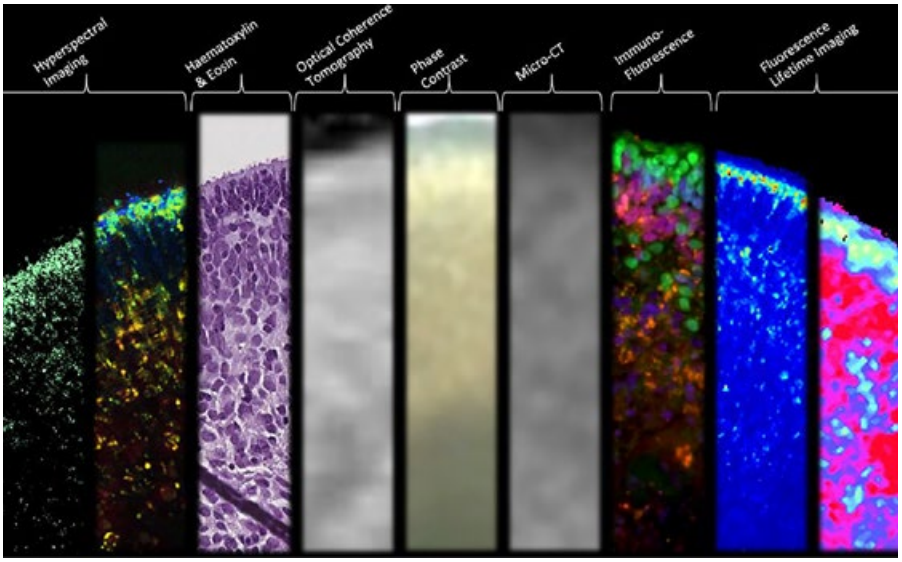


Retinoblastoma (rB) is a cancerous eye tumor whose genetic characteristics are known. To study the genetic changes in a developing tumor, a biopsy is preferred, but often impossible. Research led by Jesse Berry, MD, has suggested a promising alternative.

When researchers sequenced and evaluated the nucleic acids in the aqueous humor (AH) in eyes with rB, they discovered that AH contains sufficient tumor-derived DNA to perform genetic analysis. Chromosomal changes from the aqueous humor DNA corroborate the chromosomal changes present in the rB tumor.

Having a surrogate test method may enable scientists and clinicians to define the effects of secondary genetic changes in the tumor as the disease runs its course. Ultimately, this could advance treatment and save the vision of r8 patients through early detection.

IMAGING ***LIVE RETINA*** MODELS TO STUDY ***EYE DISEASE***



These images of the retinal organoid cells were featured in the cover story "Structural and Functional Characterization of Human Stem-Cell-Derived Retinal Organoids by Live Imaging" in Investigative Ophthalmology & Visual Science.

USC Roski Eye Institute researchers are growing and imaging retinal organoids, 3D tissue models that mimic the structure and function of the retina, light sensitive tissue found in the back of the eye. Using advanced imaging to study organoid growth in real time, researchers are advancing the understanding of retinal development, and how disease originates and progresses.

Jennifer Aparicio, PhD, and Thomas Lee, MD, developed the organoids that are being studied by David Cobrinik, MD, PhD, and his colleagues. Their novel research method uses noninvasive imaging techniques to provide deeper discovery because tissues can be observed without damage or destruction.

Active Research Funding
as of December 2017

PRINCIPAL INVESTIGATOR	PROJECT	SOURCE
Amir Kashani, MD, PhD	3D Angiography for Quantitative Characterization	NIH/NEI
Amir Kashani, MD, PhD	Functional Imaging in Hypoxic-Ischemic Retinal Disease	NIH/NEI
Amir Kashani, MD, PhD	Imaging Cerebral and Retinal Microvasculature in Cerebral Small Vessel Disease	NIH/NINDS
Amir Kashani, MD, PhD	OCT Angiography Research Consortium (OARC)	Carl Zeiss Meditec
Amir Kashani, MD, PhD	Study of Subretinal Implantation of Human Embryonic Stem Cell-Derived RPE Cells in Advanced Dry AMD	CIRM
Benjamin Xu, MD, PhD	Predictive Models for Angle Closure Disease Based on Anterior Segment Optical Coherence Tomography Measurements	USC
Biju Thomas, PhD	A Novel Tissue Engineering Technique to Repair Degenerated Retina	CIRM
Biju Thomas, PhD	Studies on Functionality of iPS-RPE Transplanted in Immunodeficient RCS Rats	BrightFocus Foundation
David Hinton, MD	An Experimental Approach to Maculopathy	NIH/NEI
Gianluca Lazzi, PhD, MBA	IMES Infinity Prosthetic System SAR Evaluation	Alfred Mann Foundation
Grace Richter, MD, MPH	Defining the Relationships of Retinal Microcirculation with Glaucoma, Systemic Disease, and Ocular Anatomic Factors in African Americans	NIH/NEI
Hossein Ameri, MD, PhD	Evaluating the Efficacy of Lipofectamine- CRISPR-Cas9 in Silencing VEGF-A Gene In Vitro	USC
J. Bradley Randleman, MD	Brillouin Microscopes to Measure Corneal Biomechanics	The Ahmanson Foundation
Jesse Berry, MD	Analysis of Chromosomal Changes and Driver Genes in the Aqueous Humor of Retinoblastoma Eyes: The Surrogate Tumor Biopsy	USC
Mahnaz Shahidi, PhD	Noninvasive Imaging of Chorioretinal Oxygen Tension	NIH/NEI
Mahnaz Shahidi, PhD	Ocular Biomarkers of Microvascular, Neural and Metabolic Function in Diabetes	NIH/NIDDK
Mark Humayun, MD, PhD	A Novel Treatment for Retinal Ischemia	NIH/NEI
Mark Humayun, MD, PhD	Genetically Engineered Universal Donor Stem Cells as a Source of Retinal Pigment Epithelium to Treat Age-Related Macular Degeneration	Howard Hughes Medical Institute
Mark Humayun, MD, PhD	Phase 1 Safety Assessment of CPCB-RPE1, hESC-derived RPE Cell Coated Parylene Membrane Implants, in Patients with Advanced Dry Age Related Macular Degeneration	CIRM
Mark Humayun, MD, PhD	Thermoresponsive Reversible Adhesive for Temporary Intervention of Ocular Trauma - II	DoD/U.S. Army
Qifa Zhou, PhD	Combined OCT/US/PAT System for Intravascular Imaging	NIH/NHLBI
Qifa Zhou, PhD	Dual-Frequency Intravascular Arrays for Functional Imaging of Atherosclerosis	NIH/NIBIB
Qifa Zhou, PhD	High Resolution Elastography of Retina Under Prosthetic Electrical Stimulation	NIH/NEI
Qifa Zhou, PhD	Large Aperture and Wideband Modular Ultrasound Arrays for the Diagnosis of Liver Cancer	NIH/NCI
Qifa Zhou, PhD	Novel Focused Ultrasound (NFU) for Transscleral Drug Delivery	USC Zumberge
Qifa Zhou, PhD	Phase Resolved ARF Optical Coherence Elastography for Intravascular Imaging	NIH/NHLBI
Rohit Varma, MD, MPH	African American Eye Disease Study (AFEDS)	NIH/NEI
Rohit Varma, MD, MPH	California Community Foundation (CCF) Research Grant	CCF
Rohit Varma, MD, MPH	Primary Open Angle African-American Glaucoma Genetics (POAAGG)	NIH/NEI
Sahar Bedrood, MD, PhD	Characterization and Structural Analysis of Fibrillar Material Found in Pseudoexfoliation Glaucoma	AGS
Sandy Zhang-Nunes, MD	Therapeutic Applications of Ultrasound for the Prevention and Treatment of Dry Eye Disease	USC Zumberge
Sarah Hamm-Alvarez, PhD	Identification of Tear Biomarkers for Parkinson's Disease Patients	Michael J. Fox Foundation
Sarah Hamm-Alvarez, PhD	Microtubule-Based Transport in Lacrimal Gland Function	NIH/NEI
Sarah Hamm-Alvarez, PhD	Protein-Polymer Nanomedicine for Sjogren's Syndrome	NIH/NEI
Sarah Hamm-Alvarez, PhD	Tear Fluid and Serum Levels of Cathepsin S and its Endogenous Inhibitor Cystatin C as Biomarkers for Sjogren's Syndrome	Sjogren's Syndrome Foundation
Thomas Lee, MD	Research to Prevent Blindness Unrestricted Grant	RPB
Vivek Patel, MD	Human Connectomes for Low Vision, Blindness, and Sight Restoration	NIH/NEI
Vivek Patel, MD	Retinal Prosthesis Neural Imaging: Measuring the Impact of Crossmodal Plasticity on Visual Restoration	Beckman Foundation
Xuejuan Jiang, PhD	The Pediatric Eye Disease Consortium: A Pooled Analysis of Individual-Participant Data from Population-Based Studies	NIH/NEI

AGS (American Glaucoma Society) • **CIRM** (California Institute for Regenerative Medicine) • **DoD** (Department of Defense) • **NCI** (National Cancer Institute) • **NEI** (National Eye Institute) • **NHLBI** (National Heart, Lung and Blood Institute) • **NIBIB** (National Institute of Biomedical Imaging and Bioengineering) • **NIDDK** (National Institute of Diabetes and Digestive and Kidney Diseases) • **NIH** (National Institutes of Health) • **NINDS** (National Institute of Neurological Disorders and Stroke) • **RPB** (Research to Prevent Blindness)

Franco Linares

> *"Now there's nothing stopping me from living my dreams."* **Franco Linares**

After Franco went blind in his left eye, his other eye was at risk. Starting at age 14, Franco experienced a series of retinal detachments and a cataract in his left eye. Surgeries helped, but eventually his vision could no longer be saved. His right eye was also threatened by previous retinal-detachment surgeries, glaucoma and severe vitreomacular traction. At risk for total blindness, Franco was referred to Linda Lam, MD, MBA, at the USC Roski Eye Institute.

Vision in Franco's right eye was poor, distorted, and blocked by vitreous debris (floaters). Dr. Lam carefully assessed his condition and developed a conservative plan of treatment. She performed surgery to remove the vitreomacular traction that caused distortion, and implanted a shunt to reduce increased eye pressure from glaucoma. As Franco's vision cleared, Dr. Lam taught him how to assess potentially blinding vision problems to help ensure early intervention and preservation of sight.

Throughout all his vision problems, Franco kept a positive attitude and channeled his energy into writing poetry and music. At follow-up visits, he shared his work with Dr. Lam. His poetry and music continued to flourish as his vision improved.

Franco is now enrolled in college and serves as a motivational speaker to inspire others with low vision to achieve their life's dreams. Now that his vision is stable, Franco has set his sights on attending law school.

Severe Vitreomacular Traction

OCULAR HISTORY

Left eye: Previous retinal detachment and prior surgery elsewhere. Vision lost.

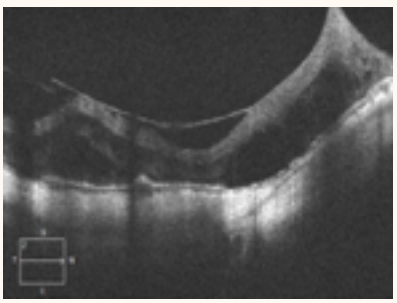
Right eye: Previous retinal detachment repair with retained silicone oil, severe glaucoma, and severe vitreomacular traction. Very poor vision.

TREATMENT

Removed silicone oil and macular pucker, and placed glaucoma shunt in right eye.

OUTCOME

Retina remained attached and macular edema improved after retinal traction was removed. Intraocular pressure decreased. Vision improved.



Optical coherence tomography (OCT) image shows the macular pucker from severe vitreomacular traction that distorted Franco's vision.

Through skilled surgical care and personal encouragement, Linda A. Lam MD MBA, improved Franco's vision so he can reach his full potential.

EXPANDING RESIDENCY OPPORTUNITIES FOR *EXCEPTIONAL STUDENTS* – RANKED 8TH IN THE NATION

With 21 residents per training cycle, the USC Roski Eye Institute is now one of the largest programs in the nation. In 2017, the Accreditation Council for Graduate Medical Education (ACGME) approved one more permanent ophthalmology residency position.

Our residents receive comprehensive exposure and education in all sub-specialty clinical and surgical areas within ophthalmology. They have a high degree of autonomy in patient care while learning from nationally respected experts.

Each year, more then 400 applicants compete for seven residency positions. The brightest and the best join generations of USC Roski Eye Institute trainees who have gone on to become leaders in ophthalmology.

NEW FULL-TIME FACULTY FOR 2017

Name	Title	Specialty
Jessica R. Chang, MD	Assistant Professor of Clinical Ophthalmology	Oculoplastic Surgery and Neuro-Ophthalmology
Kimberly Gokoffski, MD, PhD	Assistant Professor of Clinical Ophthalmology	Neuro-Ophthalmology
Gianluca Lazzi, PhD, MBA	Provost Professor of Ophthalmology and Electrical Engineering	Epiretinal Implant Devices, Biomedical Electromagnetics
Aaron Nagiel, MD, PhD	Assistant Professor of Ophthalmology	Vitreoretinal Surgery
Benjamin Y. Xu, MD, PhD	Assistant Professor of Clinical Ophthalmology	Glaucoma
Nicole Yang, OD	Assistant Professor of Clinical Ophthalmology	Visual Evaluations, Soft Contacts, Orthokeratology
Rachel Young, OD	Assistant Professor of Clinical Ophthalmology	Low Vision, Traumatic Brain Injury, Soft Contact Lenses

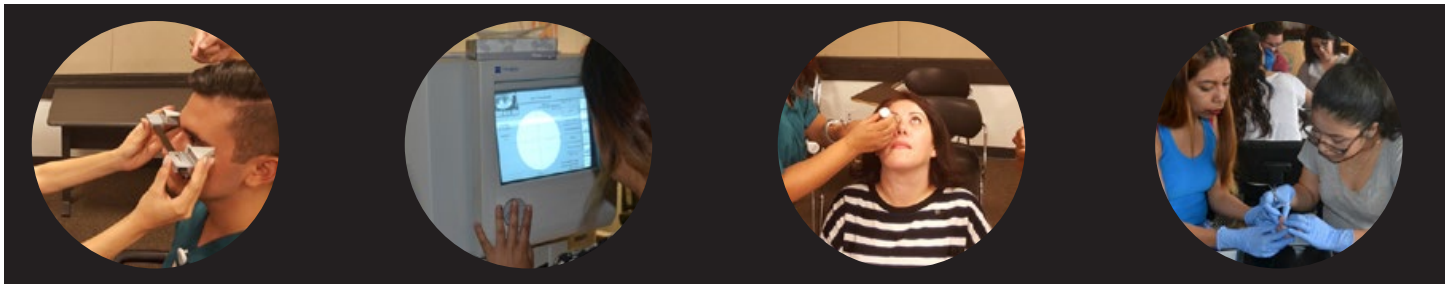
CHALLENGING AND REWARDING OPPORTUNITIES

Training is provided at four hospitals, including the **USC Roski Eye Institute at Keck Medical Center of USC, Children's Hospital Los Angeles (CHLA), Los Angeles County Hospital (LAC), and the VA Downtown Los Angeles Medical Center.** These locations offer unparalleled clinical, surgical, and academic opportunities to excel, develop, and achieve educational goals.

USC Roski Eye Institute
Keck Medicine of USC

Children's Hospital Los Angeles
We Treat Kids Better

LAC+USC Healthcare Network



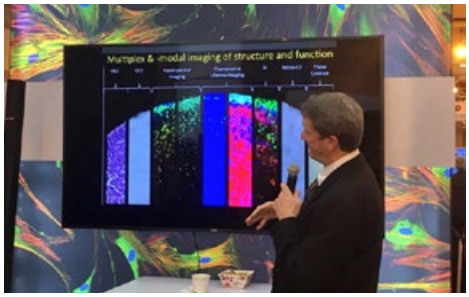
RECRUITING AND *TRAINING* TECHNICIANS TO IMPROVE OPHTHALMIC CARE

With the advent of the Ophthalmic Technician Education Program (OTEP), seven students are learning valuable skills through didactic courses and clinical rotations. They will graduate with the abilities and experience to serve patients confidently.

OTEP is meeting a growing need for ophthalmic allied health professionals while creating new opportunities for people in Los Angeles. The USC Roski Eye Institute is reaching out at local schools and community events to increase awareness of the ophthalmic technician profession.

Grants from the USC Good Neighbor Campaign and California Wellness Foundation are supporting our training and community-outreach efforts. As our OTEP graduates take their place as valued members of vision care teams, they will help improve vision care for Southern California's diverse patient population.

AAO 2017 - NEW EXHIBITOR PAVILION HIGHLIGHTS



Grand Rounds Case Study
“The Whole Shebang”

HISTORY

·21-year-old man with no past medical or ocular history was punched on the right side of his face three days prior.

·He was seen at an outside hospital ER, where a CT scan was performed without evidence of open globe or orbital fracture. Now presenting for ophthalmological follow-up.

·States he has blurry vision in the right eye.

EXAM FINDINGS

·Pupils RR OU; no RAPD

·Visual Acuity

- pH 20/400 OD; pH 20/20 OS

·IOP 19 OD, 19 OS

·Gross exam notable for periorbital ecchymosis, subconjunctival hemorrhage on the right side

·Slit lamp exam otherwise unremarkable

·Right side fundus exam

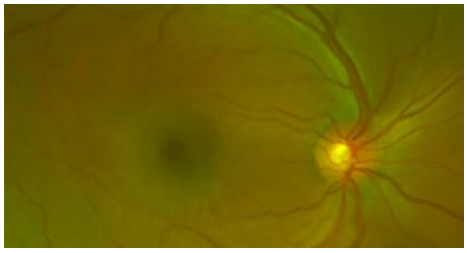


Figure 1: Right side fundus exam showing disrupted foveal contour, macular hole. Otherwise fundus exam OD unremarkable, exam OS unremarkable.

DIFFERENTIAL DIAGNOSIS

·Traumatic macular hole

ADDITIONAL INVESTIGATIONS

·OCT macula of the right eye

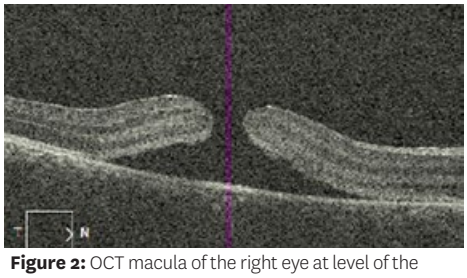


Figure 2: OCT macula of the right eye at level of the fovea showing macular hole with no evidence of posterior vitreous detachment or traction. A cuff of subretinal fluid is present without intraretinal cysts.

DIAGNOSIS

·Traumatic macular hole

PATHOPHYSIOLOGY

·A traumatic macular hole (TMH) has a different pathophysiology than an idiopathic macular hole (IMH). IMH is a disease of vitreomacular traction caused by pulling of the vitreous on the inner retina. However, studies have shown that TMH infrequently have vitreous detachments or traction. Instead, TMH are thought to occur from blunt trauma that results in a flattening of the globe in the anterior-posterior direction causing a stretching on the perpendicular plane. This physical stretching from a significant impact force causes a development of a hole in the retina (see Figure 3).

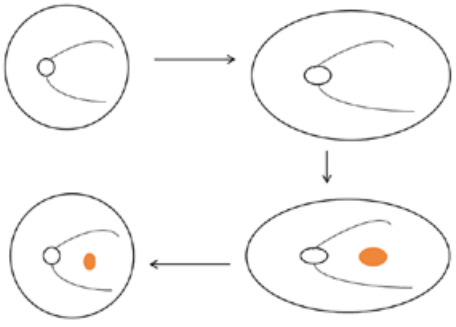


Figure 3: IMH most often occurs in older patients (due to vitreous syneresis and traction). TMH tends to occur in younger male patients, the demographic most likely to undergo blunt facial trauma.

TREATMENT

·There is evidence that some traumatic macular holes can be initially observed and may close spontaneously (see Figure 4).

·Surgical treatment requires a pars plana vitrectomy and gas tamponade. Prone positioning is required as well.

·This patient was observed for two months; however spontaneous closure did not occur. He subsequently underwent pars plana vitrectomy, membrane peel, air-fluid exchange and instillation of SF6 gas. At one month follow-up the retinal hole was closed, with best corrected visual acuity of 20/100.

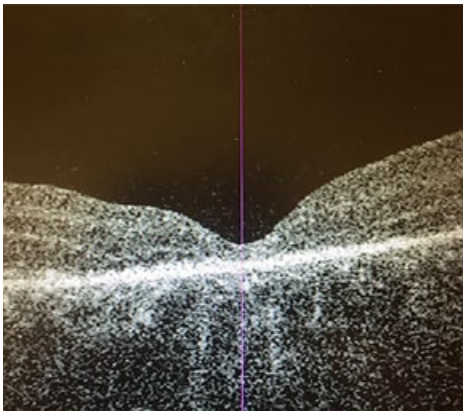


Figure 4: OCT macula right eye at level of fovea POM1. Macular hole is closed. There is disrupted foveal contour with significant centeral outer nuclear, ellipsoid zone and RPE loss.

PROGNOSIS AND FUTURE DIRECTIONS

·Recent studies have shown that TMH may close spontaneously, which often occurs within the first two to three months; if not, surgical closure is required. Large TMH were less likely to close spontaneously and more often required surgical closure. However, studies have been limited by small sample sizes and do not show statistical significance.

REFERENCES

·Huang J et al. Comparison of full-thickness traumatic macular holes and idiopathic macular holes by optical coherence tomography. Graefes Arch Clin Exp Ophthalmol. 2010 Aug;248(8):1071–5.

·Miller JB et al. Long-term Follow-up and Outcomes in Traumatic Macular Holes. Am J Ophthalmol. 2016 June;166:206–207.

·Chen H et al. Prediction of spontaneous closure of traumatic macular hole with spectral domain optical coherence tomography. Sci Rep. 2015 Jul 21;5:12343.

CONTACT

·Andrew Moshfeghi, MD, MBA, associate professor of clinical ophthalmology andrew.moshfeghi@med.usc.edu

·Luv Patel, MD, PGY-3 Ophthalmology Resident, luv.patel@med.usc.edu

SAVING CHILDREN *with* STRABISMUS *through a* GENEROUS *Gift*

Glorya Kaufman is investing in the USC Roski Eye Institute by supporting our mission to preserve and protect vision.

Children with strabismus, commonly known as crossed eyes, face serious developmental, psychological and social challenges. To improve their lives, USC Trustee Glorya Kaufman established a fund to help ensure that children in Southern California with strabismus will receive the diagnosis and care they deserve.

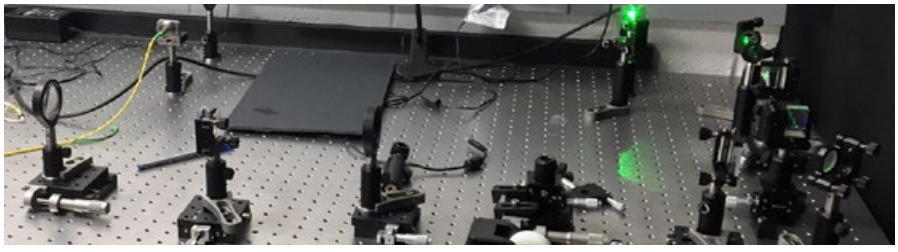
Glorya Kaufman's gift enables the USC Roski Eye Institute to reach out to our community to provide eye surgeries for children from 1 to 18 years old with strabismus, who might not otherwise be able to afford specialized care.

When strabismus is addressed early, a child's eyes and brain have a greater ability to re-learn how to work together. Timely treatment made possible by Glorya Kaufman will enable many children to enjoy fuller, more productive lives.

ACCELERATING **NEW TECHNOLOGIES** THROUGH PHILANTHROPY

Through a gift from The Ahmanson Foundation, the USC Roski Eye Institute will build and test the West Coast's first Brillouin microscopes that will be used to identify, prevent and treat ectatic disorders that distort the cornea.

"The availability of adequate tools for diagnosis is critical to the success of advancements in precision medicine. This Foundation recognizes the importance of innovations such as the Brillouin microscope, and is pleased to partner with USC," said William H. Ahmanson, president of The Ahmanson Foundation.



Ecstatic disorders are the leading indication for full-thickness corneal transplants in the United States. The advent of Brillouin microscopes will offer new hope to children and adults who now face a lifetime of deteriorating vision and possible blindness without a transplant.

BEST HOSPITALS
U.S.News & WORLD REPORT
NATIONAL OPHTHALMOLOGY
2017-18

RANKED AMONG THE TOP OPHTHALMOLOGY PROGRAMS
for 24 Consecutive Years

198
PEER-REVIEWED PUBLICATIONS

39
ACTIVE RESEARCH GRANTS

$57M
ACTIVE RESEARCH GRANT FUNDING

#2
IN RESEARCH FUNDING
2015 AND 2016
by the National Eye Institute

Ranked#8
U.S. OPHTHALMOLOGY RESIDENCY PROGRAM
by Doximity

The USC Roski Eye Institute sees patients at the following locations:

Keck School of Medicine of USC
Department of Ophthalmology
USC Roski Eye Institute
1450 San Pablo Street, 4th Floor
Los Angeles, CA 90033
(323) 442-6335

USC Roski Eye Institute
University Park Campus
3335 S. Figueroa Street, Unit E
Los Angeles, CA 90007
(213) 821-7014

USC Roski Eye Institute - Arcadia
65 N. First Avenue, Suite 101
Arcadia, CA 91006
(626) 446-2122

eye.keckmedicine.org
#usceye

USC Roski Eye Institute - Beverly Hills
9033 Wilshire Boulevard, Suite 360
Beverly Hills, CA 90211
(310) 601-3366

USC Roski Eye Institute - Pasadena
625 S. Fair Oaks Avenue, Suite 400
Pasadena, CA 91105
(323) 442-6335

USC Village Optical Shop
835 W. Jefferson Boulevard, Suite 1720
Los Angeles, CA 90089
(833) USC-EYES

Children's Hospital Los Angeles
The Vision Center
4650 Sunset Boulevard
Los Angeles, CA 90027
(323) 660-2450

FACEBOOK.COM/USCROSKIEYE
INSTAGRAM.COM/USCEYE
TWITTER.COM/USCEYE
LINKEDIN.COM/COMPANY/USC-EYE-INSTITUTE
YOUTUBE.COM/USCEYEINSTITUTE

BE VISIONARY

Give the gift of sight today

eye.keckmedicine.org/giving/

For more information, please contact Rebecca Melville, executive director of development, at (323) 442 – 5396 or Rebecca.Melville@med.usc.edu