



VISIONS

Koret Vision Institute + Beckman Vision Center + Department of Ophthalmology + Francis I. Proctor Foundation Fall 2015 + Annual Report University of California, San Francisco + That Man May See

Focal Point



Dear Friends,

We are delighted to share with you news of UCSF's transformational project to bring the Department of Ophthalmology and the Proctor Foundation to Mission Bay.

An extraordinary matching pledge from an anonymous donor is the cornerstone of our new Center for Vision Neuroscience, to open in 2019. This will allow us not only to provide state-of-the-art facilities for our patients, faculty, and trainees, but also for our leading research programs.

We enter this new era with our sights on today's and tomorrow's important ventures in clinical care, research, and education. We welcome five outstanding new residents as they begin ophthalmology training with our distinguished faculty. We also welcome six superb fellows for advanced training in ophthalmology subspecialties.

Our annual report from *That Man May See* is included in this issue and reflects that indeed it has been an exciting year. There is much ahead of us, and more than ever we thank you for your continuing generosity.

Sincerely,



Stephen D. McLeod, MD
Theresa M. and Wayne M. Caygill, MD, Distinguished Professor and Chair



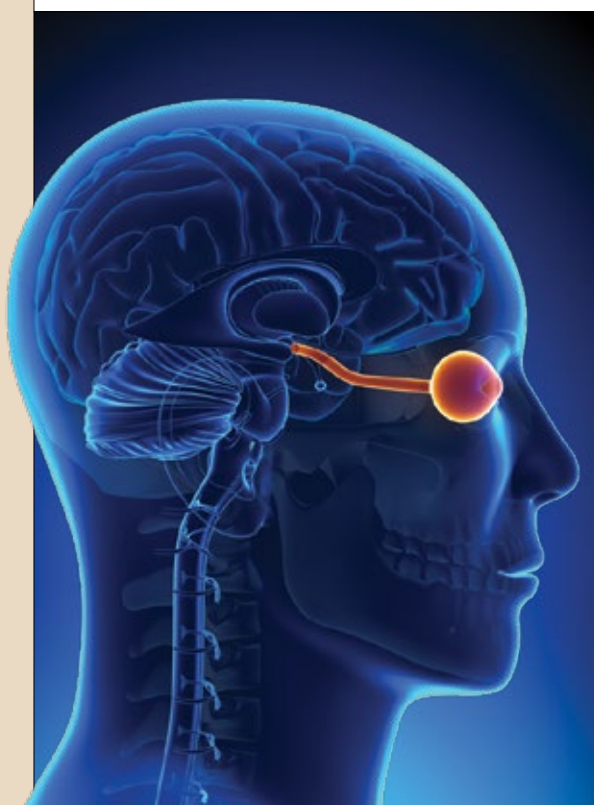
New home for Ophthalmology at Mission Bay – in the heart of UCSF's biotech campus.

UCSF Center for Vision Neuroscience New Era in Sight

Our building initiative marks the start of a new era for vision science at UCSF," announces **Stephen D. McLeod, MD**, chair of the Department of Ophthalmology. In addition to major support from the University and other early investors, the realization of a new home for Ophthalmology at Mission Bay is anchored by a transformational pledge of \$70 million from an anonymous donor.

In July, the University of California Board of Regents approved the construction of a state-of-the-art complex for research and clinical care on UCSF's Mission Bay campus. "This cutting-edge facility will bring together leading neuroscientists and clinicians to transform the treatment and prevention of vision loss and blindness," comments University President **Janet Napolitano**.

Continued on page 5



Eye-Brain Research Advances Vision Lights the Brain

How does brain disease cause vision loss? Visual neuroscience is emerging as fertile ground for new breakthroughs to halt blindness and visual disability.

"Many eye diseases are now recognized to share important features with brain diseases," explains Department of Ophthalmology Chair **Stephen D. McLeod, MD**. "These discoveries have profound implications for our research priorities."

Study of the visual system also holds promise for solving brain diseases like multiple sclerosis, Alzheimer's, and Parkinson's. The retina and optic nerve are the most accessible neurons (nerve cells) in the brain, making them key targets for study.

"Because the circuitry is basically the same throughout the central nervous system, breakthroughs in neuro-degenerative sight diseases are breakthroughs in brain diseases," says neurologist **Ari Green, MD**.

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New Fellows: Leaders of Tomorrow



Dr. Jonathan Horton

Robust Lines of Inquiry

The Department of Ophthalmology's clinician researchers and basic scientists are leading successful and expanding programs in vision neuroscience. Their potentially game-changing investigations include interdisciplinary programs that study relationships between diseases of the central nervous system and glaucoma, macular degeneration, and amblyopia.

Novel solutions will emerge from bold and sustained collaborations across UCSF's world-renowned research campus. The investigations summarized here represent wide-ranging eye-brain research underway. Programs led by neuro-ophthalmologist **Jonathan Horton, MD, PhD**, and geneticist **Doug Gould, PhD**, were featured

in *Visions* Summer 2015 ("The Genetic Frontier" and "Planting Seeds for Scientific Discovery") and *Visions* Fall 2014 ("Advancing the Search for Solutions"). See <http://thatmanmaysee.org/what-we-support/visions-newsletter/>.



Dr. Doug Gould

Ari Green, MD

Medical Director, UCSF Multiple Sclerosis Center
Director, UCSF Neurodiagnostics Center

Specialties: Neurology, Multiple Sclerosis

Project Approach: Accelerate patient testing of a novel repair strategy

Relevant Diseases: Optic Neuropathy, Multiple Sclerosis



“Breakthroughs in cancer, cardiology, and infectious disease have saved and improved millions of lives. Now we must pioneer methods to repair neural circuits damaged by disease.”

Brain Disease Revealed in Sight Loss

Sharlene began her multiple sclerosis (MS) saga with a visit to an optometrist at age 26. After referrals, UCSF's Dr. Ari Green diagnosed her blurred vision as optic neuritis resulting from MS, the most common brain-attacking autoimmune disease. Electrical signals traveling from Sharlene's eyes to the visual processing areas in her cortex were impaired by lesions in her optic nerve.

Over the next ten years, Sharlene experienced new MS attacks that damaged more neural pathways in her brain and spinal cord, slowing her gait and eventually leaving her dependent on a wheelchair. She developed tremors that interfered with her work, leading to an inability to continue at her job. The disease may even shorten her lifespan. Existing treatments can help reduce inflammation in the brain, but existing injury

persists and can progress despite the most aggressive treatment.

Speeding Potential Therapy

Dr. Green wants to develop drugs that can restore neural pathways for patients like Sharlene. MS is one of several diseases that damage myelin sheaths, which insulate neurons and help speed, as well as refine, the timing of signals transmitted through the brain. The development of treatments capable of myelin restoration is challenging because identifying promising compounds capable of catalyzing the brain's capacity for self-repair has been difficult and most chemicals cannot easily cross the blood-brain barrier.

Dr. Green collaborated with UCSF neuroscientist/cell biologist **Jonah Chan, PhD**, and his lab to screen all known FDA-approved compounds used to treat other conditions. They utilized an entirely new technique invented by Dr. Chan,

using living cells on glass pillars, to determine which compounds might show potential for myelin repair. After identifying a group of related promising medicines and further demonstrating their effectiveness in cell culture, they picked one particularly exciting candidate that showed tremendous promise in lab models of the disease. Within 18 months they advanced the treatment to a clinical trial with patients.

Preliminary results show improvement in the signal, indicating myelin repair.

Vision Shows What Works

This double-blind placebo-controlled cross-over trial will determine whether the identified compound can improve communication speed in the visual pathway for MS patients with pre-existing injury. Dr. Green's team monitors participants' vision to gauge the effectiveness of

their drug. Changes in the retina and optic nerve can be evaluated using retinal imaging and electrophysiology, easily employed techniques. The visual system is unique in that it can be assessed quickly, easily, quantitatively, and reliably. The integrated screening method, laboratory based confirmation techniques, and methods for quickly assessing which compounds are working help the team build momentum

and enhance their likelihood of success.

Dr. Green's team also uses magnetic resonance imaging and vision tests to assess changes in patients' optic nerves and brains. A visual stimulus is used to determine the average time needed for signals to travel from the retina to the visual

cortex. Preliminary results show improvement in the signal, indicating myelin repair – and perhaps neural repair. The team plans to determine whether altering the compound can enhance effectiveness.

Clinical Trial: Seeking Optic Neuritis Patients

For a second trial, Dr. Green requests support to enroll newly diagnosed optic neuritis patients. He theorizes that the chemical compound is extraordinarily promising to restore myelin structure and function early in optic neuritis and that it will help resolve some of the lingering problems patients have with contrast, color, glare, and dim light. He asks Northern California ophthalmologists and optometrists to contact Justin Inman at 415.353.2707, 858.472.4945, or Justin.Inman@ucsf.edu with referrals or to learn more.

Many Thanks to Lead Sponsors of the 2015 Alcatraz Swim for Sight

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To join this effort, go to thatmanmaysee.org/alcatraz.



Allen Distinguished Investigator Award

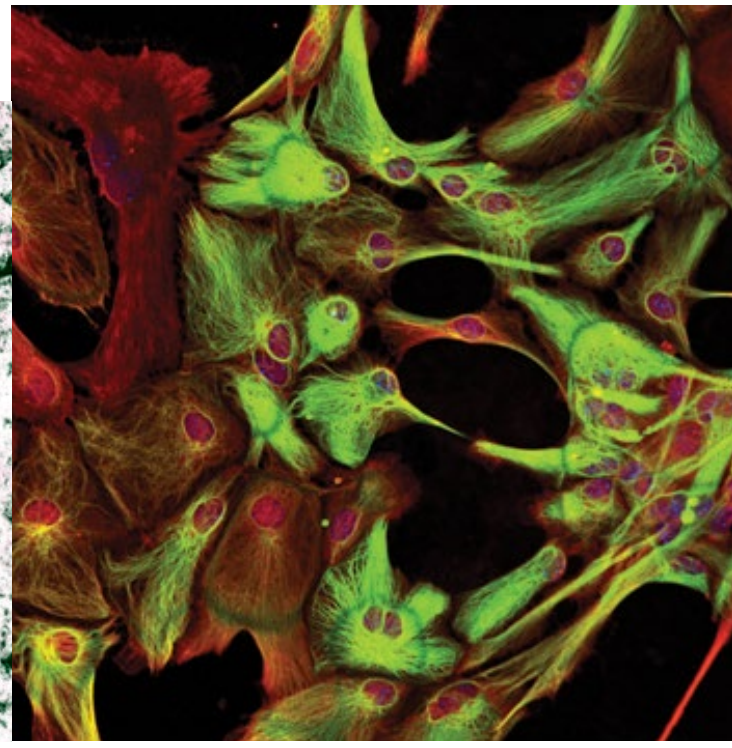
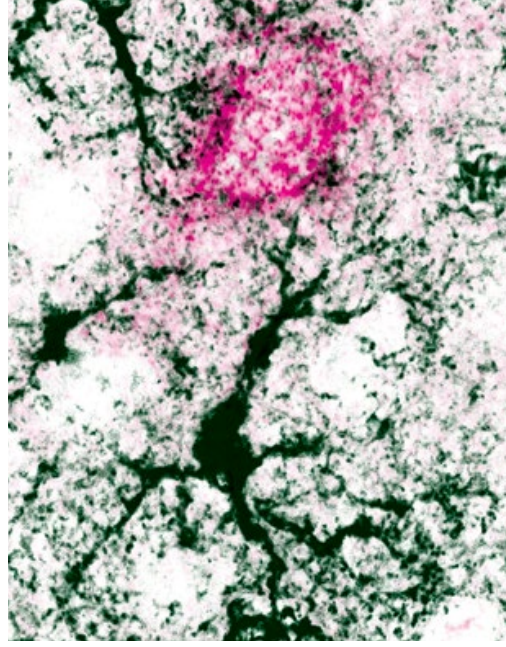
Erik Ullian, PhD, was recently chosen for an Allen Distinguished Investigator award in partnership with UCSF collaborator **David Rowitch, MD**. The award is one of six given nationally by the Paul G. Allen Family Foundation to overcome barriers in neuroscience.

The honor includes \$1 million to transform lab-generated stem cells into specialized human astrocytes

that support neurons specific to particular brain regions and functions, including vision.

Success would change how researchers study the healthy brain and provide significant new targets for treating diseases of the central nervous system.

“The potential of this work is tremendous,” says Dr. Ullian. “It’s the kind of high-risk project made possible by private philanthropy.” ●



The Ullian team recently determined that human astrocytes, pictured above, are involved in altering synapses in the visual cortex.



Erik M. Ullian, PhD

Specialty: Neuroscience

Project Approach: Study mature, specialized, human brain cells in the laboratory

Relevant Diseases: Glaucoma, Amblyopia, Strabismus, Alzheimer’s, Autism Spectrum Disorders

“Our work will help answer major questions in neuroscience and reshape how scientists explore the root causes of eye and brain disease.”

Stars in Brain Space

Dr. Ullian and his team experiment with the stars inside the brain – star-shaped glial cells called astrocytes. Like the space program, their work exists at the frontier of the unknown. Technological advances have enabled researchers to discern that astrocytes and other glial cells – long thought of as mere scaffolding for neurons – affect brain functioning.

The Ullian team has identified a signaling pathway between

impairment in autism spectrum disorders.

The Ullian team aims to identify molecules that may restore diseased synapses.

human astrocytes and neurons that may affect the timing of critical neural development. Incorrectly formed neural circuitry is linked to amblyopia and to cognitive and social

Potential to Reconnect Cells

Synapses link brain cells, enabling communication. Synaptic loss often precedes cell death in glaucoma, macular degeneration,

strabismus, and Alzheimer’s disease. How synapses are formed and eliminated remains an unanswered question in brain development. The Ullian team recently determined that human astrocytes are involved in altering these connections.

Dr. Ullian also collaborates with **Graeme Davis, PhD**, a UCSF biophysicist and chemist who uses fruit flies as a model system. Dr. Ullian

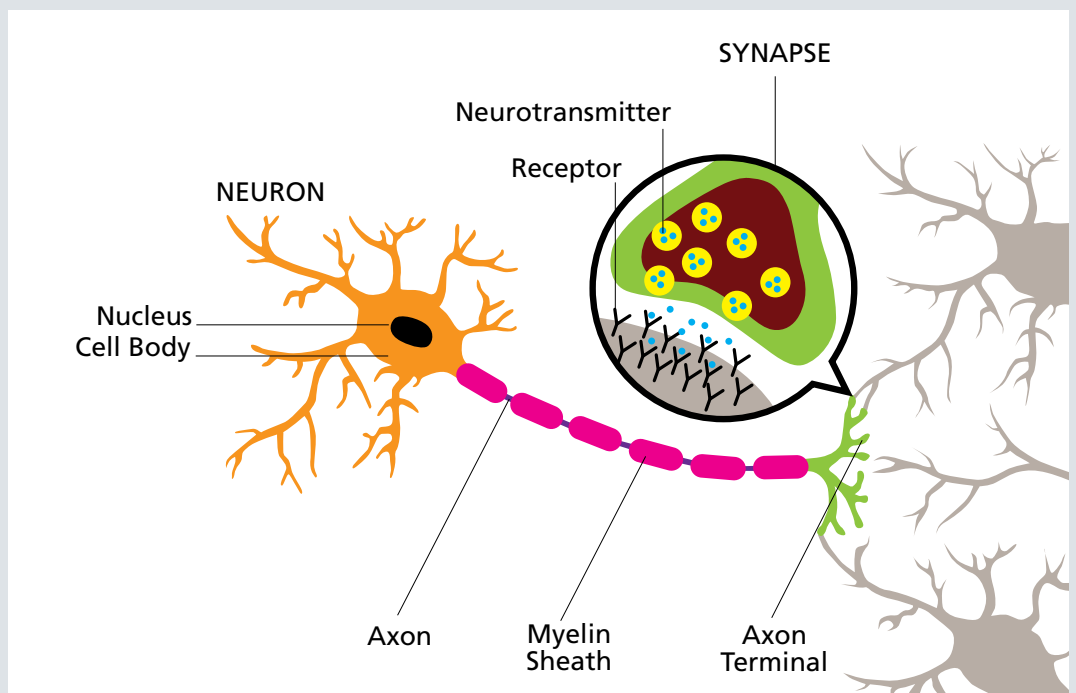
deploys technological advances developed in the Davis lab on the genetics and chemistry of synapses to uncover the processes that move messages between cells in the mammalian visual system. His team aims to identify molecules released from astrocytes that may restore diseased synapses to a healthy state.

Targeting the Brain

Diseases of the central nervous system (eye, brain, and spinal cord) rank among the top three causes of disability worldwide and include the following:

- Macular Degeneration
- Glaucoma
- Amblyopia
- Strabismus
- Dementias
- Multiple Sclerosis
- Neuromyelitis Optica
- Autism Spectrum Disorders
- Parkinson’s Disease
- Huntington’s Disease

Breakthroughs will also impact traumatic brain and spinal cord injuries.



Shedding Light on the Neural Network

100 billion neurons (nerve cells) comprise the human brain. Neural networks can relay electrical signals at 300 miles per hour. Diseases that damages these networks cause loss of sight, movement, sensation, and/or thought.



Marc Levin, MD, PhD

Specialty: Neuro-ophthalmology and Adult Strabismus
Project Approach: Evaluate a therapeutic video game
Relevant Disease: Amblyopia (known as “lazy eye”)

“Although a basic laboratory scientist at my core, I believe that patient solutions can be achieved most rapidly at the interface of academic research and tech industry innovation.”

Video Game as Novel Treatment

Nearly 10 million people in the United States have amblyopia. This disorder of neural development is usually related to ocular misalignment or differing refractive errors in each eye.

For young children, patching the stronger eye can improve sight by stimulating development of the weaker eye’s neural pathways. Unfortunately, patching shows declining success with age, with no lasting improvement for patients beyond age 12.

To benefit older children and adults, Dr. Levin works with co-investigators **Michael Deiner, PhD**, and ophthalmology resident **Christopher Aderman, MD**. The team optimizes and tests a potential virtual reality therapy developed by San Francisco-based Vivid Vision. In this win-win partnership, Vivid Vision benefits from UCSF expertise to refine its gaming strategy and apply it in a rigorous academic clinical trial.

Motivating Integrated Sight

Participants wear headsets and simultaneously use both eyes inside the immersive game environment. To succeed, they must integrate complementary images shown separately to each eye. This platform encourages the brain to engage the weaker eye in cooperation with the stronger eye.

The pilot trial also investigates computer-based, self-administered eye tests. The team compares the results of Vivid Vision’s digital eye tests (interspersed with the games) with standard in-office assessments. “The potential of on-line testing is in itself exciting,” says Dr. Levin.

This innovative binocular strategy translates research findings to the clinic.

This innovative binocular strategy translates brain/eye research findings to the clinic. Preliminary data indicate that patients playing this game can improve vision in their lazy eye and see the world “in 3D” for the first time.

Testing New Paradigms

This approach could ultimately shift amblyopia treatment paradigms for younger children. The research may facilitate development of virtual reality-based therapies for other eye/brain conditions as well.

“Reliable eye exams, taken at home, would improve our diagnostic reach and add to patient convenience and timeliness.”

Seeking Amblyopia Patients for Clinical Trial

Dr. Levin’s team seeks subjects, ages 15–45, with amblyopia in the San Francisco Bay Area to join the trial. UCSF provides game hardware and software at no cost to participants. To join the study or learn more, please contact Dr. Levin at marc.levin@ucsf.edu.



In the immersive video game environment, a brighter, complementary image is shown to the amblyopic eye. This encourages the brain to unlock suppression, enabling the patient to integrate the images seen by the two eyes.

Eye/brain research is made possible by generous funding from the National Institutes of Health, Research to Prevent Blindness, the Hellman Family Foundation, and donors to That Man May See.



Yvonne Ou, MD

Specialty: Glaucoma
Relevant Diseases: Glaucoma, Dementia

“Emerging treatment paradigms for other neurodegenerative brain diseases may also advance glaucoma treatment in the future.”

Glaucoma/Dementia Connection?

Often, research significance lies in disproving a thesis. After a publication recently concluded that glaucoma patients were four times as likely as others to later be diagnosed with dementia, Dr. Ou decided to investigate. She suspected that the researchers had misdiagnosed retinal changes that resulted from dementia as evidence of glaucoma.

To look for cognitive deficits seen in dementia, Dr. Ou teamed up with **Michael Ward, MD, PhD**; **Kate Possin, PhD**, at UCSF’s Memory and Aging Center; resident **Qi Cui, MD, PhD**; and **David Green**, a fourth-

year medical student. A battery of neurocognitive tests were administered to patients with normal tension glaucoma and patients without glaucoma. Preliminary results look like good news for these glaucoma patients, with publication of final results pending. It appears that glaucoma patients perform as well as control patients using these neurocognitive tests.

This work may lead to earlier glaucoma diagnosis and treatment.

year medical student. A battery of neurocognitive tests were administered to patients with normal tension glaucoma and patients without glaucoma.

Tracing Synapse Loss

Glaucoma specialists know that when pressure inside the eye is abnormally high, the retinal ganglion cells begin to die. Most glaucoma patients

have elevated intraocular pressure.

To understand how early in the disease process the eye/brain synapses begin to degrade, Dr. Ou looks for connections at both ends of the retinal ganglion cells.

Using confocal microscopy, her team has identified synapse loss in certain layers of the retina, suggesting that some types of retinal ganglion cells are more vulnerable to damage than others. Visual targets of the

brain, at the other end of the optic nerve, show early loss of synapses after eye pressure increases.

Dr. Ou’s work will provide further insight into how and when glaucoma affects the visual system. This could potentially lead to earlier diagnosis, monitoring, and treatment. For example, if synapses of certain cell subtypes begin to degrade before others, those subtypes could become novel targets for glaucoma treatment. ●

Center for Vision Neuroscience New Era in Sight at UCSF

Unified vision services at UCSF will substantially enhance the patient experience.

This leading multi-specialty eye care center will be dedicated to preserving and restoring sight for patients from all backgrounds who are devastated by eye disease here in the Bay Area and around the world,” says UCSF Chancellor **Sam Hawgood**.

Establishing Ophthalmology in the heart of UCSF’s biotech campus – along with a major research expansion and cross-disciplinary collaborations – will maintain and extend UCSF’s global leadership in vision research and care.

The new Center for Vision Neuroscience will integrate all of UCSF’s vision clinics and co-locate the Department of Ophthalmology and Francis I. Proctor Foundation for Research in Ophthalmology. Slated to open in 2019, it will be built on a parcel of waterfront property across from UCSF Medical Center at Mission Bay.

Clinical research, clinical trials, biostatistics, advanced teaching facilities, and support services will be housed in the new complex. Ophthalmology’s basic scientists also will move their laboratories to Mission Bay.

Better Care for Patients

Unified UCSF vision services at Mission Bay will substantially enhance the patient experience. Those



Dr. Stephen McLeod

with the most complex issues will have ready access to Ophthalmology’s full range of clinical expertise, clinical trials, and state-of-the-art technology under one roof.

The need for advanced vision care and innovative therapies continues to escalate, with 5.5 million Americans aged 40 and older expected to be affected by blindness or low vision by the year 2020. Glaucoma, age-related macular degeneration, and diabetic retinopathy remain major challenges.

Promise of Neuroscience Solutions

Multidisciplinary eye/brain research will be a major focus of the Center for Vision Neuroscience. The proximity



Dr. Thomas Lietman

of the ophthalmology faculty to scientists in the Sandler Neurosciences Center, Byers Hall, Genentech Hall, and Arthur and Toni Rembe Rock Hall will sustain and nurture vital alliances.

UCSF’s vision neuroscience programs are thriving and draw researchers with expertise in:

- Neurodevelopment, degeneration, and regeneration;
- Directly related areas of eye conditions and diseases including glaucoma, retinal degeneration, and amblyopia;
- Bioengineering, drug delivery, and ophthalmic devices.

Extending Proctor’s Global Reach

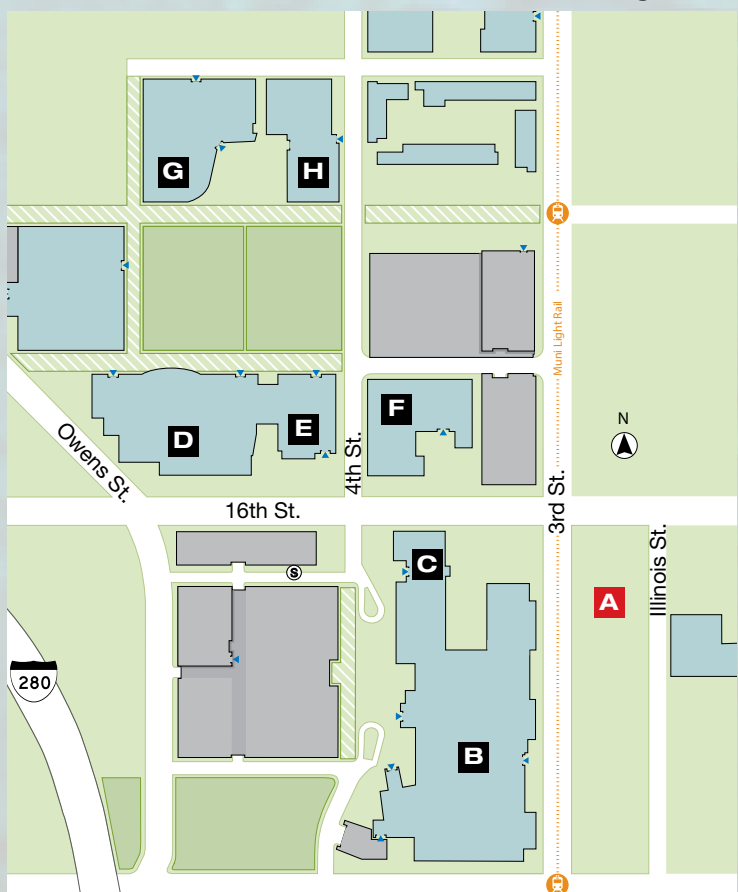
The move integrates the Proctor Foundation’s clinical facilities with its worldwide research enterprise. The Mission Bay campus is home to related global health disciplines, positioning Proctor’s clinician scientists to leverage more UCSF partnerships. The Proctor Foundation focuses on infectious and inflammatory eye diseases

that threaten the sight of millions worldwide.

“The new home at Mission Bay puts our faculty in the same complex as the ophthalmology department for the first time,” says Proctor Foundation Director **Thomas M. Lietman, MD**. “This will enhance training, research, and, most importantly, patient care.” ●



Partners at UCSF Mission Bay



- A** Site – Center for Vision Neuroscience
- B** UCSF Medical Center at Mission Bay
- C** Ron Conway Family Gateway Medical Building
- D** Genentech Hall
- E** Byers Hall
- F** Mission Hall
- G** Sandler Neurosciences Center
- H** Arthur and Toni Rembe Rock Hall

Meeting the Challenge

An anonymous foundation, UCSF, and other generous donors have brought the Campaign for UCSF Ophthalmology to over 70 percent of its \$150 million funding goal. By making its pledge a matching challenge, the largest donor is motivating other philanthropists to realize a new era in vision care and discovery supported by:

- State-of-the-art facilities and equipment for excellence in advanced vision care; clinical and laboratory research; the education of outstanding residents, fellows, and vision scientists; and community outreach;
- Accelerated research to better understand the root causes of eye disease, and to develop effective preventive and therapeutic measures;
- Flexible funding for emerging opportunities and needs; and
- Endowment growth to ensure long-term financial stability to sustain vital research and education programs.

To learn more about the campaign, contact *That Man May See* at tmms@vision.ucsf.edu or 415.476.4016.

That Man May See Leaders in Key Board Roles

Two dynamic leaders enrich the board of That Man May See, taking on key roles as UCSF Ophthalmology enters a new era of growth and expansion. **Amy S. Millman**, president of BNY Mellon Wealth Management, Northern California, and **R. Douglas Norby**, senior technology executive, met recently to discuss opportunities ahead for breakthroughs in vision research.

Doug joined the board of That Man May See this year and chairs the audit committee. Amy served as vice president after joining the board in 2012 and was elected new board chair at the October 2015 annual meeting.

Expertise Advances Ophthalmology

With a degree in management and finance from Pace University, Amy forges highly accomplished teams in the financial industry. Her charisma and strategic skills help advance campaign success for the University and That Man May See, engaging people in support of Ophthalmology's new building campaign.



Doug brings expertise in financial management and strategic planning and a successful track record in early-stage and public companies ranging from biotech to semiconductors and storage to film. With dual degrees from Harvard University, Doug's skills and appreciation for care benefit That Man May See at this time of growth.

The two directors share a strong interest in science. Their leadership helps to attract support for faculty programs that can dramatically change diagnostic and treatment paradigms for future generations.

Amy and her husband Paul live in Tiburon. She has served as chair of

Make-A-Wish of the Greater Bay Area and sits on the finance committee of the Jewish Community Federation of San Francisco. Doug and his wife Susan live in Belvedere and San Francisco. They are San Francisco Opera enthusiasts and supporters, and Doug serves on the board of the World Affairs Council. ●

That Man May See Thanks You

Thank you for your generous contributions and pledges for vision research, teaching, patient care, and community outreach received between July 1, 2015, and October 8, 2015.

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For a complete donor list, please visit www.thatmanmaysee.org/who-we-are/contributors.





Dear Friends of That Man May See,

Our annual report comes to you at a most exciting time. Stephen D. McLeod, MD, chair of the ophthalmology department, has announced plans for construction of a new Center for Vision Neuroscience at Mission Bay. In partnership with the University, we will be extremely busy over the next three years, gathering like-minded supporters who care about vision and are dedicated to the ultimate eradication of preventable blindness worldwide.

Your gifts this past year have fueled the achievements of one of the nation's most productive teams of clinician scientists and laboratory researchers. Now more than ever, your loyalty to this cause can make a real difference.

We are most thankful to our anonymous lead donor for helping launch our campaign with one of the largest philanthropic gifts for vision science in the country. The total fundraising project will include capital construction, equipment for the new building and research laboratories, ongoing and expanded scientific programs, flexible investments to seed fund timely projects, and endowments to financially strengthen Ophthalmology at UCSF.

Vision is a gift we cherish. Everything we do at That Man May See focuses on assisting the faculty in its mission of aiding patients in seeing the world with healthy eyes.

As we embark on this new venture, we hope you will deepen your commitment. We thank you again for your support that leads to a world in which all may see.

With gratitude,

John P. Rohal
Chair, Board of Directors
That Man May See

Impact of Your Donations

ENDOWED PROFESSORSHIP

Andrew Yau of Bangkok funded his second endowed chair with a generous gift to That Man May See: the Michael J. Hogan, MD, and Andrew Yau Chair in Ophthalmic Pathology at UCSF. J. Brooks Crawford, MD, and Devron H. Char, MD, recently inspired UCSF Ophthalmology alumni to contribute to the endowment, bringing honor to Mr. Yau and also to Dr. Hogan, a distinguished department chairman and highly regarded pathologist.

NAMED FUNDS

Emmett Cunningham, MD, PhD, established The Robert Nozik Lectureship to enrich education of faculty, residents, and fellows.

CLINICAL EQUIPMENT

Don and Judy McCubbin, David and Joan Traitel, and Chuck Robel enabled the purchase of a femtosecond laser that expands options for precise cataract surgery.

FACULTY RECRUITMENT & LAB RENOVATIONS

Koret Foundation and the Kimball Foundation provided additional support to establish the practices of new faculty **Anthony T. Moore, MD**, pediatric ophthalmologist and inherited eye disease specialist, and **Majid Moshirfar, MD**, a cornea, external disease, refractive surgery, and uveitis specialist.

Koret Foundation and the Kimball Foundation also support recruitment of a new glaucoma specialist.

RESEARCH

Macular and Retinal Degenerations
The Lisa and John Pritzker Family Fund, John Hall and Rebecca Derrington, Loretta Emerzian, and Lynn Pasternak support multifaceted research by **Dan Schwartz, MD, Jay Stewart, MD, and Robert Bhisitkul, MD, PhD**, to advance new solutions for those with macular degeneration and retinal diseases.

The Claire Giannini Fund established a pediatric retinal disease clinic and supports the research of **Jacque Duncan, MD; Bertil Damato, MD, PhD, FRCOphth; Tony Moore, MD; and Alejandra de Alba Campomanes, MD, MPH**, to improve the sight of infants, children, and future generations.

Neuro-ophthalmology

The Hellman Family Fund supports the Alzheimer's-retinal research of **Ari Green, MD, and Michael Ward, MD, PhD**.

Glaucoma

Ronald and Anita Wornick support the neuroscience research of **Yvonne Ou, MD, and Erik Ullian, PhD**, to advance novel diagnostics and treatments.

The Fortisure Foundation enables worldwide glaucoma study, led by **Robert Stamper, MD**, to develop cost-effective screening protocols and medical and surgical treatments for developing countries. The study is expanding to more eye hospital sites in India to accelerate impact.

Morey Weingarten, MD, supports **Shan Lin, MD's** studies of angle-closure glaucoma, which have led to substantial improvements in the diagnosis and treatment of this cause of blindness.

Cornea

Steven L. Pease supports the work of **David Hwang, MD, FACS**, for development, dissemination, and teaching of new methods for corneal disease and cataract therapy, including novel surgical procedures.

Infectious and Inflammatory Eye Diseases

Peierls Foundation; Harper-Ingilis Memorial Fund for Eye Research; the Sara & Evan Williams Foundation; Perkins Hunter Foundation; Jerome H. Debs II; Ivan, Maris, and Harry Meyerson; and Marilyn and Jack Whitcher support studies by the Proctor Foundation that formulate

and test potential solutions to save sight and lives worldwide.

Peer-Reviewed Investigations

Seed funds allow researchers to initiate novel projects with a high potential for success. Demonstrated results allow faculty members to seek federal funding. This year's projects include the following:

- **Matilda Chan, MD, PhD**, explores the role that matrix metalloproteinase, a product of immune cells called macrophages, plays in corneal inflammation due to herpes. This investigation has the potential to lead to a new therapeutic target for corneal disease.
- **David R. Copenhagen, PhD**, examines a novel pathway for light sensitivity in the eye that is independent of classical photoreceptors. The study may inform how preterm infants can be affected by light in neonatal intensive care and have implications for therapy in diseases such as retinopathy of prematurity.
- **Bertil Damato, MD, PhD, FRCOphth**, investigates the genetics of uveal melanoma. This study may reveal a new way to identify patients most at risk of metastatic disease.
- **Ari Green, MD and Michael Ward, MD, PhD**, seek to ascertain the bioactive domains of progranulin sufficient to reduce retinal lipofuscinosis and inflammation in dry AMD.
- **Ying Han, MD**, tests a novel approach to solve scarring and undesired wound healing following implantation of glaucoma drainage devices.
- **Marc Levin, MD, PhD**, seeks to determine whether a specific type of immersive, binocular vision therapy using a virtual reality gaming platform will improve sight for teen and adult patients.

- **Nancy A. McNamara, OD, PhD**, investigates whether Lacriprep, a synthetic and biologically active fragment of lacritin, is therapeutically effective in a lab model of dry eye.
- **Jay M. Stewart, MD**, explores possible mechanisms by which hormonal differences between women and men may contribute to the development of incident vitreoretinal pathology.
- **Erik M. Ullian, PhD**, examines whether E-cadherin and its associated macromolecular complex are involved in retinal ganglion cell targeting in the lateral geniculate nucleus of a lab model.

EDUCATION

Thomas R. Mazzocco, MD, and members of the Frederick C. Cordes Eye Society support medical student, resident, and fellow education.

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The Augie Fund – Glasses and Specialized Lenses for Children
Gerson and Barbara Bakar, Bruce U. Wintroub, MD, and Marya Wintroub support this fund, which enables vulnerable UCSF pediatric eye patients who needs glasses or specialized lenses to get them – easily and without financial strain on their families.

Alcatraz Swim for Sight
Corporate sponsors DocuSign, Spark Therapeutic, and Avalanche Biotech support the 4th annual fundraiser.

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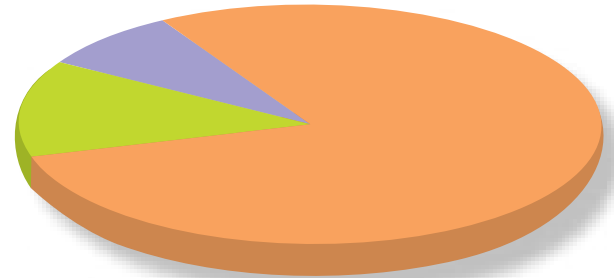
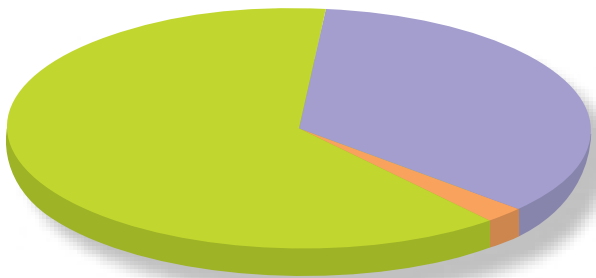
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Donations from Individuals, including bequests and trusts	\$1,844,736	\$510,000	\$2,354,736	63%	Research, Education, Patient Care and Community Services	\$2,983,970	79%
Donations from Corporations and Foundations	\$911,418	\$409,100	\$1,320,518	35%	Fundraising	\$469,848	13%
Earnings on Deposited Funds**	\$79,832		\$79,832	2%	Management and Administration	\$301,268	8%
Total Revenue	\$2,835,986	\$919,100	\$3,755,086	100%	Total Expenses	\$3,755,086	100%

*Board of Regents and UCSF Foundation

**Includes fee reimbursements from UCSF



Welcome New Faculty

Department of Ophthalmology

Armin Afshar, MD, MBA

Ocular Oncologist and Vitreoretinal Specialist

MD: University of Illinois, Chicago

Residency: University of Chicago

Fellowships: Retina/Vitreoretinal Surgery and Ocular Oncology, UCSF

Q You just completed three years of advanced training with UCSF ophthalmologists. How did that weigh in your decision to accept a faculty position?

A We have an incredible multidisciplinary team for treating eye tumors, led by Dr. Damato in Ocular Oncology, with Dr. Stewart, Dr. de Alba Campomanes, Dr. Bloomer, Dr. Crawford, Dr. Kersten, Dr. Vagefi, plus extremely talented clinical support staff, as well as leading geneticists. These resources translate into unmatched patient care and research opportunities.

Q How did Dr. Damato's arrival to lead Ocular Oncology influence you?

A Dr. Damato has pioneered many of the therapies we use to treat eye tumors today. His enthusiasm and holistic approach really resonated with me. To understand the genetic defects involved in ocular melanomas, Dr. Damato and I collaborate with Dr. Boris Bastian, a thought leader in skin melanomas. I am correlating genetic profiles of ocular melanomas with their clinical features to better understand the disease.

Q How does your master's degree in business administration fit into your plans?

A I am interested in conducting cost-benefit analysis of our diagnosis and treatment methods, to maximize healthcare value.

Q Tell us something about how you got here.

A My father was a big influence. After 35 years, he continues his obstetrics/gynecology practice in Chicago. I hope to have such a stimulating career.

Q How did surfing play into your UCSF training?

A Dr. Bhisitkul is passionate about surfing and very good at it! During my first fellowship year, his research fellows and I were inspired to take lessons.

Q How else do you relax?

A Surfing has become a very enjoyable hobby, and I like running marathons. I've been on call for the last two Bay to Breakers but hope to run it in the future... minus a crazy costume! ●

Staff Profile: Kelly Babic Beyond Measure

Master Sonographer, Manager, and Hand Holder. Too long for a name tag, it's a fair description of what **Kelly Babic, MS, CDOS**, does. Ocular oncology imaging is her specialty, but most UCSF Ophthalmology clinics depend on her expertise.

First Look at Eye Cancer

A referral for cancer is never good news. Kelly is on the front line, providing reassurance and diagnostic tests. "Ultrasound testing is a critical tool for the diagnosis, treatment planning, and follow-up care of ocular oncology patients," says Kelly. "I take pride in telling patients that the UCSF oncology team – Dr. Damato and Dr. Afshar, with support from retina specialist Dr. Stewart – is second to none."

Kelly's technical experience and people skills make her an excellent sonographer. Ophthalmologists have difficulty examining eyes with cloudy corneas or opaque lenses, so sonograms often provide the first good look. "I enjoy identifying pathology and being first to view and describe what is going on inside the eye."

"Work is my passion."

Kelly images adult and pediatric UCSF vision patients at clinics on the Parnassus campus, at Mission Bay, and at Mount Zion Hospital. Her precise measurements help determine the effectiveness of cataract surgery replacement lenses. Kelly also supervises diagnostic services and technician training.



"Work is my passion, and this job is the culmination of a 20-year career path," says Kelly. Beyond her trips around San Francisco, Kelly commutes each week from San Diego, where her husband (a UCSD research scientist) and three children are settled. Weekends are for surfing, soccer and shared down time. "It's not easy to commute on a plane to work each week, but for UCSF it's worth it," she says.

The feeling is mutual. **Jay Stewart, MD**, sums up department sentiment this way: "Kelly's dedication, expertise, and collaborative approach are unparalleled. We are lucky to have her!" ●

Kelly holds a master's degree in immunology and is a Certified Diagnostic Ophthalmic Sonographer.

Proctor Foundation

Thuy Doan, MD, PhD *Uveitis Specialist*

MD: Stanford University

Residency: University of Washington, Seattle

Uveitis Fellowship and PhD, Neuroscience: University of Washington, Seattle



Q Why did you decide to specialize in uveitis?

A Although significant progress has been made, many questions about uveitis remain unanswered. I felt this was a field where I could apply my research and clinical training to address some of these questions and improve patients' lives.

Q Uveitis is one of the least understood eye diseases. Tell us a little about it.

A Characterized by inflammation of the internal structures of the eye, uveitis has many potential causes. These include autoimmune conditions, such as lupus and sarcoid, and infections with many pathogens, including viruses, bacteria, fungi, and parasites.

Q How does this affect your work with patients?

A The broad differential of causes makes uveitis diagnosis among the most challenging in ophthalmology. In fact, a definitive diagnosis is made less than 40 percent of the time. We rely not only on imaging and lab testing but also thorough and nuanced exams.

I love taking on this challenge, particularly since an accurate diagnosis has such tremendous impact for my patients – reduced symptoms, improved vision, and prevention of blindness in some cases.

Q Are you looking for unknown disease causes?

A Yes. We believe it's likely that some uveitis-causing pathogens are undetectable by conventional tests. I use next-generation sequencing, which is

more sensitive than traditional methods, to search for unknown causes. These studies will provide insight into uveitis development, improve diagnosis, and ultimately result in more effective therapies. I am fortunate to collaborate with uveitis specialist **Dr. Nisha Acharya** and the laboratory of biochemist **Joe DeRisi, PhD**.

Q What was attractive about joining Proctor and moving to San Francisco?

A The Proctor faculty is internationally renowned for its work. Having the opportunity to move to San Francisco and work with Tom, Nisha, and the rest of the Proctor team is a dream

come true. Also, San Francisco is an amazing city! Because I have family in the area, I was very excited to make the move.

Q What types of collaborations do you plan?

A I'm eager to participate in Proctor's international work. For example, its ongoing randomized-controlled trials in African communities study mass antibiotic administration for the eradication of trachoma. Samples collected in these trials provide a one-of-a-kind opportunity to examine how antibiotics impact the collections of microbes that live on and in the human body, including the ocular surface. ●

Patient Point of View Retinal Crisis Averted

Leonard and Diane Lea are all smiles – with good reason. Len is happily recovering from emergency retinal surgery at UCSF.

The couple had just spent three months in Europe and the British Isles, celebrating a life milestone and finding great subjects for Len's camera. On their way home to Oregon, they stopped in San Francisco. It was here that Len saw new floaters in his right eye and sensed a change in his vision. His eye felt sticky, and he wanted to keep rubbing it.

Same-Day Laser Surgery

Len went online and found that his symptoms could indicate an impending retinal detachment. A hasty phone call and immediate appointment later, UCSF's **Armin Afshar, MD, MBA**, confirmed the patient's suspicions. After skilled hunting with an ophthalmoscope, Dr. Afshar found a tiny tear and performed laser surgery the same day.

Quickly reattaching the tear prevented a larger detachment from forming and causing loss of sight. "I was happy to treat Len," says Dr. Afshar. "The position and tiny size of his tear made it challenging to find," he explains. "and it was important to repair it immediately."

Detached Retina: Threat to Sight

The retina is the light-sensitive layer of tissue that lines the inside of the eye and sends visual information through the optic nerve to the brain. The retina can be lifted or pulled away from the pigmented cell layer that nourishes it. Repair within 24-72 hours is needed to prevent permanent sight loss. New floaters, brief flashes of light, a sense of heaviness in the eye, and a dense shadow or "veil" are common symptoms that call for urgent care. Laser surgery "welds" the retina back in place.

"I was fortunate to receive such prompt attention," says Len, "and especially appreciated Dr. Afshar's



thoroughness and explanation every step along the way. Everyone we encountered at UCSF Ophthalmology was knowledgeable as well as compassionate."

The bottom line for Len: he is back in Oregon, taking more photos and sending them out on his blog – lenzlenz.blogspot.com. ●

Teaching in Nepal Halting Corneal Blindness

In a quest to reduce the corneal blindness and disability rampant in Nepal, UCSF's Proctor Foundation invited the country's ophthalmologists to a cornea summit last fall. If every Nepalese ophthalmologist had attended, they still would have fit in one seminar room.

An estimated 150 ophthalmologists serve Nepal's 26 million people. This despite a high incidence of ocular trauma and corneal ulcers that lead to corneal blindness, particularly among the nation's many farmers.

Cornea specialists from Nepal, India, and UCSF shared expertise on diagnosis and drug and surgical treatments with more than 90 Nepalese ophthalmologists, ophthalmic assistants, and other eye health center workers. Group excitement culminated in the planning of a second Cornea Symposium for Nepal for late 2015, despite upheavals from the major earthquake that struck the country in April. ●

UCSF ophthalmologists Dr. Jack Whitcher (retired), Dr. Jeremy Keenan, Dr. Stephen McLeod, Dr. Tom Lietman and Dr. Jennifer Rose-Nussbaumer shared expertise at the summit.



Faculty News



Richard L. Abbott, MD

Invited Lecturer: Improving Patient Safety in Ophthalmology: A Global Initiative, Sicilian Society of Ophthalmology at the University of Catania, Sicily

The World Health Organization has identified medical error as a major problem for all countries and referred to it as a global issue of epidemic proportions. Dr. Abbott discussed initiatives for improving patient safety and offered concrete initiatives to reduce medical error.



Jacque L. Duncan, MD

Honor: Garland W. Clay Award

This award is presented to the author or authors of the manuscript published in *Optometry and Vision Science* that has been most widely cited in the world of scientific literature in the preceding five years. The publication was: Godara, P, Dubis, AM, Roorda, A., **Duncan, JL**, Carroll, J. Adaptive optics retinal imaging: emerging clinical applications, *Optometry and Vision Science* 87, 930-941 (2010).



Cynthia S. Chiu, MD, FACS

Invited Lecturer: Infection Prophylaxis in Cataract Surgery and Nuclear Fragmentation in Phaco Surgery, Asian-Pacific Academy of Ophthalmology Annual Symposium, Guangzhou, China



Douglas B. Gould, PhD

Publication: Alavi MV, Chiang WC, Kroeger H, Yasumura D, Matthes MT, Iwawaki T, LaVail MM, **Gould DB**, Lin JH. In vivo visualization of endoplasmic reticulum stress in the retina using the ERAI reporter mouse. *Investigative Ophthalmology & Visual Sciences*, 2015 Oct. [E-publication ahead of print]

Common forms of retinitis pigmentosa and many other diseases are caused when mutant proteins misfold and become toxic. Dr. Gould's team characterized a new genetic resource in which a small fluorescent molecule 'turns on' when photoreceptor cells become stressed. This resource will enable long-term study of autosomal dominant retinitis pigmentosa and has potential to measure the efficacy of novel drugs.



Thomas M. Lietman, MD

Scholar-in-residence: Kellogg Eye Center, University of Michigan

Dr. Lietman's expertise spans cornea, uveitis, external eye disease, biostatistics, and epidemiology.



Shan C. Lin, MD

Publication: Singh K, **Lin SC**. Association between body levels of trace metals and glaucoma prevalence, *Journal of the American Medical Association Ophthalmology*, 2015 Aug 6. [E-publication ahead of print]

Dr. Lin's large population study showed that high levels of certain trace metals are associated with glaucoma. Elevated blood levels of mercury were associated with a greater risk for self-reported glaucoma, however higher levels of manganese were protective against self-reported glaucoma.



Nancy A. McNamara, OD, PhD

Publication: Vijmasi T, Chen FY, Balasubbu S, Gallup M, McKown RL, Laurie GW, **McNamara NA**. Topical administration of lacritin is a novel therapy for aqueous-deficient dry eye disease. *Investigative Ophthalmology & Visual Science*, 2014 Jul 17;55(8):5401-9.



Yvonne Ou, MD

Invited Lecturer: "How do neurons die or survive in glaucoma?" The Daniel Scott Weston Glaucoma Research Lecture, Glaucoma Research Foundation, Palo Alto, CA

The Weston Lecture is presented by a nationally recognized scientist or clinician to showcase advances in knowledge of glaucoma, particularly in the area of new therapies and progress toward a cure.



Jay Stewart, MD

Publication: Lee O-T, Good SD, Lamy R, Kudisch M, **Stewart JM**. Advanced glycation end-product accumulation reduces vitreous permeability. *Investigative Ophthalmology & Visual Science*, May 2015, Vol.56, 2892-2897.

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2015 Fellows Leaders of Tomorrow



Daniel Chao, MD, PhD
Surgical Retina
Mentors: Drs. Bhisitkul, Schwartz, de Juan Jr., Stewart, and Duncan
MD: Stanford University
Residency: Bascom Palmer Eye Institute
Birthplace: Troy, Michigan



Evan Kalin-Hajdu, MD
Oculoplastics
Mentors: Drs. Kersten and Vagefi
MD and Residency: University of Montreal
Birthplace: Montreal



Andrew Kao, MD
Ocular Oncology
Mentor: Drs. Damato and Afshar
MD: UCSF
Residency: New York Eye and Ear Infirmary of Mount Sinai
Birthplace: Bakersfield, CA



Tova Mannis, MD
Cornea and External Disease
Mentors: Drs. Moshirfar, Hwang, Rose-Nussbaumer, Acharya, Holsclaw, Gonzales, and Keenan
MD: UC Davis
Residency: University of Southern California Eye Institute
Birthplace: Sacramento, CA



Yohko Murakami, MD
Glaucoma
Mentors: Drs. Stamper, Lin, Han, and Ou
MD: Stanford University
Residency: University of Southern California Eye Institute
Birthplace: Tokyo



Nina Ni, MD
Cornea and Anterior Segment
Mentors: Drs. Moshirfar, Hwang, Rose-Nussbaumer, Acharya, Holsclaw, Gonzales, and Keenan
MD: Yale University
Residency: Wills Eye Hospital
Birthplace: Livingston, NJ

International Fellows



Panrapee Funarunart, MD
Glaucoma
Mentor: Dr. Stamper
MD: Prince of Songkla University
Residency: Songklanagarind Hospital
Birthplace: Bangkok



Marissé Masís Solano, MD
Glaucoma
Mentor: Dr. Lin
MD and Residency: Costa Rica University
Fellowship: Instituto Conde de Valenciana
Birthplace: Cartago, Costa Rica



Wipada (Kae) Laovirojjanakul, MD
Uveitis and External Disease
Mentors: Drs. Acharya and Gonzales
MD: Chulalongkorn University
Residency: Khon Kaen University
Birthplace: Bangkok

Department of Ophthalmology Inspiration and Passion Advance Research



Projects shared at the 2015 Department of Ophthalmology Research Day show the breadth of ongoing investigations. Inspired by unmet patient needs and passionate scientific curiosity, research teams advance understanding and the quest for new clinical solutions.

CORNEAL DISORDERS

Emily Khuc, BA (Chan lab) Global analysis of DNA methylation changes in fuchs endothelial corneal dystrophy
Shawntay Chaney, PhD (Copenhagen lab) Melanopsin in the cornea: a mechanism of acute photophobia?
Marc Levin, MD, PhD Small-molecule cystic fibrosis transmembrane regulator activators for dry eye therapy
Denise Stephens, PhD (McNamara lab) Immune cell infiltration alters corneal innervation in a laboratory model of aqueous-deficient dry eye
Jennifer Rose-Nussbaumer, MD Corneal transplant surgical trial

GLAUCOMA

Saidas Nair, PhD Molecular factors contributing to angle-closure glaucoma
Yvonne Ou, MD Selective vulnerability of retinal ganglion cell subtypes in glaucoma

David Sretavan, MD, PhD

Nanophotonic sensor for intraocular pressure detection using light

MELANOMA

Armin Afshar, MD, MBA (Damato lab) Detection of uveal melanoma metastasis and prognostication using cell-free DNA levels

OPTIC NEURITIS, MULTIPLE SCLEROSIS

Ari Green, MD Remyelination in the anterior visual pathway: from lab models to human trials

RETINAL TOPICS

Felice Dunn, PhD Initial steps of synapse disassembly in the retina
Doug Gould, PhD Allelic and mechanistic heterogeneity in gene COL4A1 pathogenesis
Jeanette Hyer, PhD Why is the central retina different from the peripheral retina?

Tony Moore, MD, PhD Phenotypic heterogeneity in patients with retinal dystrophies caused by mutations in CRB1 gene

Daniel Schwartz, MD Ocular particle remover

Michael Ward, MD, PhD Selective vulnerability of the retina in frontotemporal dementia

VISION-SPECIFIC NEURAL CIRCUITRY

Dang Dao, PhD (Ullian lab) A cadherin/catenin network facilitates the targeting and refinement of retinogeniculate connectivity

VITREORETINAL DISEASE

Ferhina Ali, PhD (Stewart lab) Estrogen and vitreoretinal disease
Jay Stewart, MD Advanced-glycation end products and the vitreous in diabetic retinopathy ●

That Man May See is a 501(c)3 public charity. Its mission is to raise funds for the dedicated faculty of UCSF Ophthalmology to make possible breakthroughs in vision research, state-of-the-art patient care, educational opportunities for residents and fellows, and community service.

To make a gift of cash or securities, go to www.thatmanmaysee.org/donate or call 415.476.4016 or email tmms@vision.ucsf.edu. Checks are payable to That Man May See.

That Man May See

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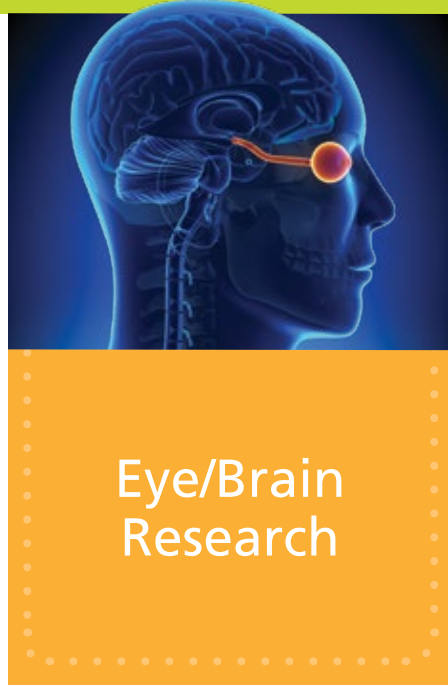
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MD: University of Pennsylvania
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MD: UCSF
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