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By *MARILYN B. METS, MD, AOS PAST PRESIDENT, CYNTHIA L. BEAUCHAMP, MD, AND CHRISTINE M. BEAUCHAMP*

Dr. George Robert Beauchamp passed away the morning of April 21st 2016 in Dallas, Texas at the age of 73 years. George was born in 1942 in Pontiac, Michigan to the late Dr. George Albert Beauchamp and Kathryn Elizabeth McCarbery Beauchamp. He graduated from New Trier High School in Winnetka, Illinois before pursuing his undergraduate degree at the University of California, Berkeley and his medical degree at Northwestern Medical School. While serving his country in the United States Army, George continued his education at Walter Reed Army Medical Center where he completed his internship and residency. He pursued his fellowship training in both corneal surgery and pediatric ophthalmology in Washington, DC at the Washington Eye Center and Children's Hospital National Medical Center under the tutelage of the late Dr. Marshall M. Parks, a lifelong mentor and friend.

Dr. Parks proposed him for membership in the AOS and he became a member in 1995. His thesis was on "Neurofibromatosis Type I in Children." George was an active member of the AOS community up to the time of his death. He was on the program for this year's meeting with a presentation titled "Value Creation where Control Meets Complexity: Protocols in Medicine" by George Beauchamp, Russell Gonnering and Cynthia Beauchamp. He passed away four weeks before the meeting.

Throughout his career, which was dedicated to optimizing the potential of every child for whom he cared, Dr. Beauchamp worked both in private practice in Washington, D.C. and in the department of ophthalmology at The Cleveland Clinic. In 1991, he relocated to private practice in Dallas, Texas and would later be joined by his daughter, Dr. Cynthia L. Beauchamp. Having the opportunity to teach, partner with and change children's lives in conjunction with his daughter, Cynthia, was one of the greatest joys of his personal and professional life. Dr. Beauchamp was a leader in the field of pediatric ophthalmology, serving as an early Director of the American Association for Pediatric Ophthalmology, and Strabismus which was conceived and founded by Dr. Parks, and also a Board Director of the American Board of Ophthalmology. He was Chairman of the Ethics Committee for the American Academy of Ophthalmology and was an Ethics Professor of Clinical Ophthalmology at the University of Texas Southwestern Medical Center at Dallas. He had a passion for ethics, especially as it relates to the patient physician encounter and relationship. He fiercely defended that relationship, refusing to be relegated to the position of "provider." He served as President and subsequently Chairman of the Board of the Children's Eye Foundation, the AAPOS foundation dedicated to ending preventable vision loss in children. He dedicated over 30 years of his life with great passion and love to the Children's Eye Foundation. He trained hundreds of young ophthalmologists throughout his career, treating each one with the same respect and kindness. He traveled extensively internationally to teach, mentor and perform charitable surgery throughout his career. His travels took him to Bangladesh, Malta, Peru, Honduras, and the West Indes—experiences he would reflect upon throughout his entire career. Dr. Beauchamp published over 80 articles in peer reviewed medical journals and authored several book chapters. In 2007 he published his first book, Slaves to Medicine; in 2012, his daughters published his book of life values, entitled Pop Pop's Rules. His research included subjects as varied as pediatric glaucoma, anterior segment, strabismus, and performance measures applied to medical outcomes. He approached every problem with great curiosity and intellect, choosing always to work to get from 'curious' to 'grateful' in every endeavor.

Above all, George was a kind and gentle man: a doctor, author, medical philosopher, teacher, mentor, husband, father and wonderful "pop pop". He was universally loved by children, young and old. He adored his family and spending idyllic time with them at the summer home he designed on Long Pond Lake in the woods of Maine. George was also a lifelong fan of the Chicago Cubs, an

aficionado of chocolate, and a frequent adopter of animals: including quail, wood ducks, horses, and dogs. He loved to tell jokes both to his colleagues and to his patients. He gave the warmest handshake or hug. He will be remembered for his dulcet tones, described a "silver tongued orator," either in intimate conversation or lecturing to a crowd. His unfailing optimism and joy of life were gifts to all who knew him.

He is survived by his loving and loyal wife of almost 50 years, Suzanne Chelborg Beauchamp, his daughters: Christine Marie Beauchamp of New York, NY, and Dr. Cynthia Lais Beauchamp (Dirk Christian Fisher) of Dallas, Texas, his grandchildren: George (Christine's son, whom she named in honor of her father), and Cynthia's sons, Kyle, Chase, and Finnley, his sister, Anne Beauchamp Fahner (Tyrone Fahner) of Chicago, Illinois, as well as a beautiful community of extended family, colleagues, and friends.

DONALD J. DOUGHMAN, MD

By *Mark Mannis, MD*

On May 2, 2016, American ophthalmology lost one of its bright stars. Donald J. Doughman passed away peacefully in Minneapolis at age 82.

Don was a native of Iowa, the youngest of three children. After graduating from Drake University with a degree in Music Education, he taught high school for two years. He ultimately decided on a career in medicine and graduated from the University of Iowa Medical School in 1961.

He completed residency training at the University of Iowa and served his military obligation at the U.S. Public Health Service in Boston. His tour of duty was followed by a cornea fellowship at the Massachusetts Eye and Ear Infirmary.

Fellowship training launched what was to become a distinguished academic career marked by excellence in clinical medicine, the training of over 200 residents and fellows, and a robust research program focused primarily on corneal preservation and eye banking. He joined the University of Minnesota Department of Ophthalmology in 1972, was advanced to Associate Professor in 1975, and served as professor and chairman of the department from 1979 -1990. He rounded out his academic career serving as chief ophthalmologist at the Minneapolis Veterans Administration Medical Center. He served as director of the Minnesota Lions Eye Bank for 36 years.

Don's research career focused largely on corneal preservation and transplant techniques. He led a team of scientists and physicians who developed significant improvements in corneal preservation that extended preservation times to allow for the scheduling of surgeries and the transport of tissues across long distances, rendering corneal transplant surgery available to many more patients. Other areas of research interest included early studies on photorefractive keratectomy. He published over 100 scientific papers in peer-reviewed journals.

At a national level, Don was instrumental in developing the Medical Standards for the Eye Bank Association of America and served as president of the Contact Lens Association of Ophthalmology. Colleagues recognized his work through a number of awards, including the Eye Bank Association of America's R. Townley Paton Award in 1989, Honor Awards from the American Academy of Ophthalmology, the Lions International Helen Keller Sight Award, the Lions International Melvin Jones Fellowship in 1998 and the Minnesota Academy of Ophthalmology's Budd Appleton Award for Service to Ophthalmology in 2013. He was also a long-time member of the prestigious American Ophthalmological Society.

His career was also marked by generous humanitarian service, including participation as a volunteer faculty with Orbis International and as a volunteer surgeon in Sierra Leone.

But for those who knew Don Doughman, what remains most memorable was his great warmth and magnanimous spirit. He will be remembered for his uncompromising ethical standards as a physician and his calm and encouraging teaching style in the operating room. He genuinely loved seeing younger physicians grow and flourish and took great pride in those he trained. His prodigious scientific contributions were matched by a grace of spirit that he communicated to his many trainees. Don Doughman left a rich legacy of scientific achievement and set an example as teacher and clinician for a generation of ophthalmologists.

BARRETT GEORGE HAIK, MD, FACS

By *Natalie C. Kerr, MD, FACS*

Barrett George Haik, MD, FACS, passed away in New Orleans, Louisiana, on Friday, July 22, 2016. Dr. Haik was born in New Orleans on September 8, 1951, into a family of ophthalmologists. The son of George M. Haik, MD, and Isabelle Saloom Haik, he graduated from Centenary College with a Bachelor of Science in Biology and earned his medical degree and his PhD in Anatomy from the Louisiana State University Medical School. After residency at New York's Edward S. Harkness Eye Institute at the Columbia-Presbyterian Medical Center, Dr. Haik joined the faculty at Cornell University and the Memorial Sloan-Kettering Cancer Center. In 1986, he moved to Tulane University in New Orleans as a professor of Ophthalmology. He was also made program director and medical director of the Eye, Ear, Nose and Throat Hospital, and in 1991, Dr. Haik was named the George M. Haik, Sr., MD - St. Giles Foundation Professor of Pediatric and Adult Ophthalmic Oncology. In 1995, Dr. Haik was recruited to be Chairman of the University of Tennessee Health Science Center Department of Ophthalmology. After 17 years as chairman, Dr. Haik took on the role of director of the Hamilton Eye Institute. A prolific fundraiser, Dr. Haik raised more than $100 million dollars for the Hamilton Eye Institute and its programs.

Dr. Haik's love of ophthalmology was evident in his dedicated, loyal, and selfless service to organized medicine. He was past president of the Association of University Professors of Ophthalmology, the American Eye Study Club, and the American Society of Ophthalmic Ultrasound; a fellow of the American Academy of Ophthalmology, the American College of Surgeons (for which he also served three consecutive three-year terms on the Board of Regents), and the New York Academy of Medicine; and a member of the American Ophthalmological Society.

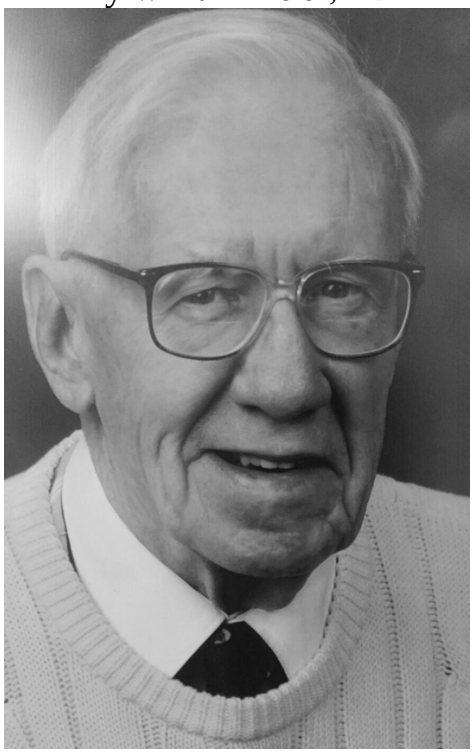
Dr. Haik authored more than 160 peer-reviewed journal articles, book chapters and abstracts. He was internationally renowned as an expert in the diagnosis and management of ophthalmic tumors and received numerous grants for his research. He served on the National Advisory Eye Council and the National Eye Institute Advisory Council for the National Institute of Health. Dr. Haik gave hundreds of presentations in both national and international forums. He received a Healthcare Heroes Lifetime Achievement Award from the Memphis Business Journal and a Life Achievement Honor Award from the American Academy of Ophthalmology.

Dr. Haik cultivated deep and lasting friendships and promoted the careers of countless ophthalmologists and medical leaders during his lifetime. His true passion was helping people. He touched the lives of countless medical students, residents, fellows, and junior faculty, and gave many leaders in medicine and ophthalmology his loyal mentorship and support. He also touched countless lives through international outreach. He traveled to Panama frequently for medical missions and lectured around the world to teach physicians how to identify and treat pediatric ocular cancers.

When not caring for patients or teaching others, Dr. Haik enjoyed the company of his friends and family, fishing at the family's camp in Venice, Louisiana, and spending time with his bloodhound Maddie. He is survived by son Christopher Barrett Haik (Sofia) and Claire Marie Haik (James Anthony Schakleford). He is also survived by brother Dr. George M. Haik, Jr.; brother Dr. Kenneth Haik (Diana); sister Suzanne Terrell (Lee); and his close companion Blanca Phillips.

JAMES E. MCDONALD, MD

By *William Mieler, MD*



James E. McDonald, AOS emeritus, passed away peacefully on Jan 31, 2016 at the age of 93. He was predeceased by his beloved wife, Lyn. He is survived by three children Mary Jo, Virginia and Michelle, 4 grandchildren and 6 great grandchildren.

Dr. McDonald, a native of Oak Park, IL. received both his undergraduate and medical degrees from Loyola University, Chicago. He served his internship at the Cook County Hospital in 1945 where he met his future wife Lyn, also an intern, while assigned to the same general ward in the massive hospital. After his internship he went on active duty as a captain in the army, beginning his ophthalmology residency at Presbyterian-St. Lukes Hospital and completing it at the Illinois Eye and Ear Infirmary. He remained on the faculty at the Eye & Ear Infirmary for the next 20 years where he rose to the rank of professor and Acting Chairman his last 2 years there. According to Dr. Marilyn Miller, AOS member, "as chairman 'Jay' was the first to organize the department into separate subspecialties, placing some of the top subspecialists such as Dr. Joseph Haas, Dr. William Hughes and others as section leaders."

Dr. McDonald was recruited to become the John P. Mulcahy Professor and Chairman of Ophthalmology at Loyola University Medical Center and Chief of the Eye Section at Hines Veterans Hospital. He was instrumental in recruiting Dr. Morton Goldberg to replace him at the Infirmary as chairman. Dr. Goldberg credited Dr. McDonald as the one who shaped the department in the modern subspecialty mold.

Most notably, Dr. McDonald will be remembered for his over 30 years of international charitable work. Responding to the plight of the blind of Haiti he co-founded FOCUS (Foreign Ophthalmological Care from the United States) in 1962. As Chief Executive Officer and Founding Director of FOCUS for years he staffed, maintained and supplied eye clinics in the Republic of Haiti, Guatemala, Columbia and Nigeria. He recruited over 300 ophthalmologists from all over the U.S, Canada, Great Britain and Belgium to serve monthly tours of duty since its founding. The Mercy Eye Center he opened in Abak, Nigeria in 1990 continues to train ophthalmologists and serve the needy patients of that nation today. Dr. McDonald retired from practice in 1997, but continued his work with FOCUS traveling to Nigeria for many years afterwards. Dr. Marilyn Miller credits "Jay" with introducing her to "the challenges and rewards of working in other countries especially Nigeria."

Dr. McDonald was a spirited physician-scientist, teacher, superb ophthalmic diagnostician, surgeon and inventor. He published more than 60 articles and abstracts, trained hundreds of residents and designed an inventive lens nucleus expressor for cataract surgery. Dr. McDonald was an AOS member, served as President of the Chicago Ophthalmological Society, as an examiner for the American Board of Ophthalmology and Director of the Society for the Prevention of Blindness. He was on the Advisory Board of the Dry Eye Institute, International Society of Dacryology and received the Lacrima Award at the First International Tear Film Symposium. He has a named Lectureship in his honor at Loyola University, Chicago

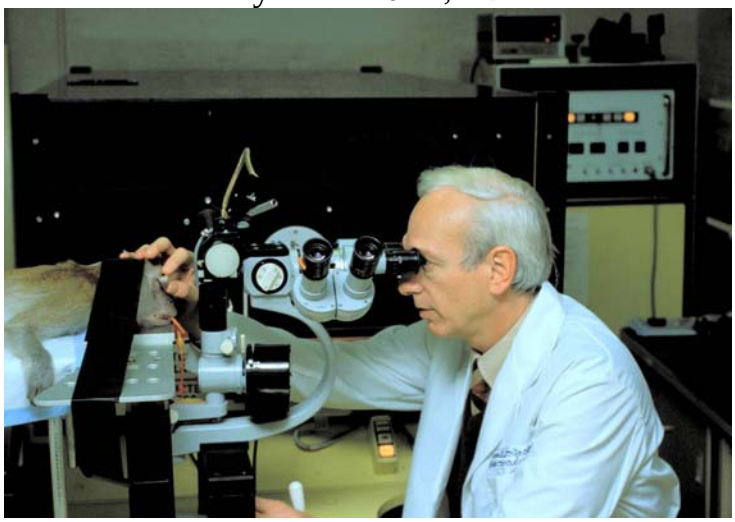
and was given the Honored Alumnus Award from the University of Illinois Eye and Ear Infirmary. Dr. McDonald was awarded the Stritch School of Medicine Medal in 1980, the Presidential Award of the Illinois Association of Ophthalmology in 1996 and the 1997 Outstanding Humanitarian Service Award by the American Academy of Ophthalmology. Perhaps his most cherished award came in 1988 when he was conferred the title " Obong Uwana Abak" (Chief of Light) by the Nigerian paramount ruler for his

monumental humanitarian work in that country.

Dr. McDonald was a man of integrity and great courage. Known by his students as “Prof”, he was highly esteemed by his colleagues and beloved by his residents and patients. He was a dedicated and talented teacher who exhorted his residents with “Be Happy!” An energetic, practical missionary, he wanted only to “make blind people see.” In the words of his former resident Dr. Roseline Ekanem Duke of Cross River State, Nigeria, ”Dr. McDonald was a visionary, generous, amiable and dedicated person that made the most impossible tasks possible. With him any dream that would alleviate the suffering of the poor and needy was his goal to achieve. He was exemplary, a shinning star and one in a million.” Dr. McDonald will be remembered for his equanimity, charity of heart, good works, avuncular nature and most notably, his kindness. His passion for helping his fellow man lives on in the many residents, students and colleagues who’s lives he touched.

IRVIN P. POLLACK, MD

By *ALAN ROBIN, MD*



On March 1, 2016, Irvin Pollack, a member of the AOS for over 30 years, passed away. He left his wife Marlene, 5 children, and 10 grandchildren. He had a great balance between family, service, academics, and teaching.

Irv went to Johns Hopkins University for his undergraduate training, the University of Maryland for Medical School, and Washington University for his residency. When he joined the Wilmer faculty upon his return to Baltimore in 1962, he was able to successfully be both chief of the glaucoma service at Hopkins while simultaneously having a private clinical practice. His private practice was that of many of the greats in ophthalmology: Bodenheimer,Friedenwald and Patz. I was very fortunate to join Irv in his practice in 1979. With most contracts, usually being multiple single spaced pages of "legal speak", my contract with Irv was two paragraphs: giving me one month free rent and asking me to pay him a small rent monthly. He encouraged Harry Quigley to join the Wilmer faculty and Irv went out of his way to help support Harry throughout his career.

In 1983, he left his private practice, and helped to develop the residency program at Sinai Hospital in Baltimore. Despite his new position, he was always a loyal to his roots at Wilmer. He was also a founding member of the American Glaucoma Society. In 1998 he retired from his practice, but remained active in fund-raising.

Everyone loved Irv. Irv was kind and gentle, speaking softly but his messages carried a big stick. Irv was the consummate teacher and father to all of his residents and fellows. He was a great listener. He loved to help those whom he taught and always worked with them to help them succeed. He always had Hostess cupcakes and peanut butter and would readily share these with his students. Referring physicians loved him and would always call him for free advice. He had uncanny clinical judgment. He worked out of one lane and spent hours with his patients. Despite the wait, patients would always leave saying how lucky they were to have him as their ophthalmologist. In fact, a friend (who lived in Baltimore) of one of his patients who lived 90 minutes away, would plan on the long wait and bring a picnic lunch to his office. When a new glaucoma specialist joined him (me) and he was running hours behind, patients would always prefer to wait for Irv rather than being seen immediately. He was always positive and one never heard Irv criticize a colleague. He was a true father and did his best to help others advance. He led by example and would always welcome residents and fellows to his house for dinner and holidays.

Irv was really one of the founding fathers of laser therapy for glaucoma. He was an innovator in both argon and ND:YAG laser iridotomy, and trabeculoplasty. He was also in part responsible for the use of alpha agonists in glaucoma therapy. He was a great team player and collaborator in one of the NIH's first multi-centered studies in ophthalmology, the glaucoma collaborative study with coworkers from San Francisco, Saint Louis, Iowa, and New York. Although it never succeeded, Irv was way ahead of his time developing in the mid-1970s an on-line clinical advice web site to help doctors who had patients with glaucoma problems. He published more than 65 peer-reviewed papers and mentored many department chairmen, heads of glaucoma departments, and other noteworthy ophthalmologists.

Irv will be sorely missed by all he touched.

MINUTES OF THE PROCEEDINGS

One Hundred and Fifty-Second Annual Meeting

May 19-22, 2016

The ONE HUNDRED AND FIFTY-SECOND ANNUAL MEETING of the American Ophthalmological Society (AOS) was held at The Broadmoor, Colorado Springs, Colorado

On May 20, 2016, Friday, President Marilyn B Mets, MD called the opening session to order. The program began with the following AOS-Knapp symposium.

SYMPOSIUM: INNOVATIVE PARADIGM SHIFTS IN OPHTHALMOLOGY

1. Introduction J. Sebag, Md
2. Phenotype Vs. Genotype: What Inherited Diseases Foretell About Tomorrow's Definition Of Disease Eric Pierce, Md, Phd
3. Beyond Visual Acuity: New Paradigms Of Measuring Vision Alfredo A. Sadun, Md, Phd
4. From Space To Earth: Nanoimaging For Earlier Detection Of Eye Disease Rafat R. Ansari, Phd
5. The Evolution Of Therapeutics In Ophthalmologyjean-Marie A. Parel, Ing Ets-D, Phd

SCIENTIFIC SESSION, FRIDAY, MAY 20, 2016

1. Active Rap1 Inhibits Inflammatory Mechanisms Of Rpe-Induced Vegf Expression And Choroidal Neovascularization **Mary Elizabeth Hartnett**, Haibo Wang
2. OCT Angiography Of Macular Ganglion Cell Circulation In Glaucoma **David Huang**, Yali Jiat, Liang Liu, Hana Takusagawa, Beth Edmunds, Lorinna Lombardi, **John C. Morrison**
3. Oct Angiography Of The Macula After Plaque Radiotherapy Of Choroidal Melanoma. Comparison Of Irradiated Versus Nonirradiated Eyes In 65 Patients **Carol L. Shields**, Emil Anthony T. Say, Wasim A. Samara, Chloe T. L. Khoo, Arman Mashayekhi, **Jerry A. Shields**
4. Multimodality Imaging In Polypoidal Choroidal Vasculopathy **Gregg Kokame**, Jessica Shantha
5. OCT Angiography Of Type 1 Versus Type 3 Neovascularization Before And After Anti-VEGF Therapy In Patients With AMD **David Sarraf**, Nopasak Phasukkijwatana, Laura Kuehlewein, SriniVas Sadda

EXECUTIVE SESSION, SATURDAY, MAY 21, 2016

Marilyn B, Mets, MD**:** Good morning everyone I'd like to call the order of this Executive Session of the 152nd Meeting of the American Ophthalmological Society.

The Executive Vice President, Dr. Hans Grossniklaus will now give his report:

2016 AOS PRESIDENT MARILYN B. METS, MD

REPORT OF THE EXECUTIVE VICE-PRESIDENT 2016

HANS E. GROSSNIKLAUS, MD: The AOS currently has a balance of $8,544,824, of which approximately $150,000 is used to subsidize our Annual Meeting. We have 211 Active Members and 150 Emeritus Members. The AOS helped sponsor the Heed Retreat last September and will again this September. This is a retreat for ophthalmology residents who show an aptitude for academic ophthalmology careers. We also support travel grants for council member guests, and we have three available for guest registrants of AOS members who who will present and/or are likely to be nominated to be members of the AOS. We sponsor the Blodi Lecture, the Verhoeff Lecture, and non-AOS symposium speakers.

We had a strategic planning retreat March 18 through 20, 2016, and identified the core values for the AOS to be professionalism, excellent, leadership, collegiality, ethical behavior, integrity, independent thought, and mentorship. Our goal is to be the thought leader in ophthalmology. Our strategies include continually addressing current and future critical issues in ophthalmology, and proactively seeking ideas in thought leadership. We want to have the AOS promote a culture of safe dialog, attract cutting-edge talent, provide a forum for expression of cutting-edge material, and actively recruit thought leaders.

REPORT FROM THE COUNCIL CHAIR

ANNE L. COLEMAN, MD, PHD: For the past year, Dr. David Tse, Chair of the Committee on Programs, and I have been preparing an exciting program for the 153rd AOS Annual Meeting to be held at the Homestead in Hot Springs, Virginia. The 153rd Annual Meeting will include paper and poster abstract presentations presented throughout the meeting and CME credits will be offered this year. This year's Knapp Symposium will be on "Optic Nerve Regeneration and Reconnection: Current Status, Challenges and Audacious Future Goals Innovative Paradigm Shifts in Ophthalmology" and the Saturday Symposium will focus on “Quality of Care: Improvement Based on Evidence”. The third Frederick Blodi lecture is to be given by Joseph Caprioli, MD, and will be on “A New Look at Perimetry for Glaucoma”. We will also be hosting social events, including tennis tournaments, golf and skeet shooting! The meeting should prove to be outstanding and I encourage our members to attend.

REPORT OF THE AOS AUDIT COMMITTEE

DAVID J. WILSON, MD: Dr.Wilson is the Chair of the AOS Audit Committee this year with additional members Jay Erie, MD, and Hans E. Grossniklaus (EVP). The Audit Committee met on May 31, 2016 with additional guests including Kelly Anderson of Burr, Pilger, and Mayer Accountants and Alice Paw as Finance Manager, American Academy of Ophthalmology. Attending SF AMS Management staff included Lisa Brown, Timothy Losch, and Amber J. Mendes, AOS, Client Services Manager. . The Committee reviewed the Fiscal Year 2015 Audited Financial Statements and Ms. Paw provided an overview. Ms. Paw noted that there were no significant changes to the presentation of the footnotes. Ms. Paw reported that the total net assets decreased from the prior year primarily as a result of an increase in expenses, transfer of cash and unfavorable market conditions. Dr. Wilson excused the SF AMS and Academy Finance staff and the Committee met in executive session with representative from Burr, Pilger, and Mayer. They did not encounter anything with respect to the financial condition of the organization that would be considered unusual or warrant further investigation. Dr. Wilson adjourned the meeting of the Audit Committee without any having determined any irregularities

REPORT OF THE COMMITTEE ON THESES

JOHN THOMPSON, MD: Chair and reporting member, Committee Members include: Dimitri Azar, M.D. and Henry Jampel, M.D. The AOS Thesis Committee reviewed 11 theses since the 2015 AOS meeting. Two thesis were accepted after revisions. Seven theses required minor revisions and the revisions are expected to be returned within one month. There were two theses that will require major revisions and the authors will have until January 2017 to resubmit the revised theses.

REPORT OF THE EDITOR:

EMILY Y. CHEW, MD: It is a great privilege and honor to serve as your editor of the Transactions of the American Ophthalmological Society (TAOS). We welcome changes that are ongoing on the mode of submission of the AOS theses. We are actively engaging an editorial service from one of the publishers to build an on-line submission of all the theses. This is yet to be finalized.

We are actively discussing the potential fate of the AOS thesis. A task force is convened to explore the role of the thesis for membership in the AOS. This has been a tradition that distinguishes the AOS from other societies in our profession. Candidates are nominated to present a thesis within 3 years of nomination. The reasons for examining the theses requirement for membership include discussions from the retreat to modernize our organization. A number of members have commented that they have received negative comments as well as refusals to join the AOS because of the thesis requirement. These are candidates who routinely publish their research in various peer-reviewed journals, including prestigious journals in their field. The candidates will not publish in the Transactions (TAOS) because there is currently no impact factor and we do not publish more frequently than annually. Clearly, we would not receive their best work. Less frequently, there may be a candidate who does not publish extensively in the scientific peer-reviewed journals but may contribute to theses that deal with medical education, health economics, ethics, etc. We will poll our members with potential options for the form of the AOS thesis in the future. We look forward to having your input.

REPORT OF THE COMMITTEE ON PROGRAMS

JERRY SEBAG, MD: The 2016 AOS Knapp Symposium entitled *Innovative Paradigm Shifts in Ophthalmology* presented a futuristic perspective on diagnostic and therapeutic paradigm shifts, some of which are already occurring, that are destined to substantially improve Ophthalmology:

1. Introduction J. Sebag, Md
2. Phenotype Vs. Genotype: What Inherited Diseases Foretell About Tomorrow's Definition Of Disease Eric Pierce, Md, Phd
3. Beyond Visual Acuity: New Paradigms Of Measuring Vision Alfredo A. Sadun, Md, Phd
4. From Space To Earth: Nanoimaging For Earlier Detection Of Eye Disease Rafat R. Ansari, Phd
5. The Evolution Of Therapeutics In Ophthalmologyjean-Marie A. Parel, Ing Ets-D, Phd

Of note is the multi-disciplinary appeal: genetics and visual function assessment applicable to all diseases; nano-imaging promises to soon improve the assessment of cataracts, and possibly vitreous disorders; new therapeutic modalities will soon impact the treatment of glaucoma and retinal diseases.

The 2016 Frederick C. Blodi Lecture was presented by Elias I. Traboulsi, MD entitled ZONULES AND MOLECULES: THE UNDERLYING PATHOPHYSIOLOGY OF ECTOPIA LENTIS

The 2016 AOS Saturday Symposium on Health Care Delivery featured Tele-Ophthalmology by Lloyd Paul Aiello, MD, PhD of The Joslin Diabetes Center at Harvard Medical School and the role of non-MDs in the delivery of eye care by Joanne Conroy, MD CEO of the Lahey Clinic. These important developments will affect all members of the AOS, regardless of specialty and practice setting.

For the general program there were 29 abstracts received, of which 19 were accepted as podium presentations (3 were AOS theses). Of the remaining, 7 were poster presentations. New features to the general program this year were that the talks were organized into groupings. The Knapp Symposium which featured new technologies was followed by all OCT Angiography papers, as this is a very new technology in Ophthalmology. All 'health care delivery' papers followed the Health Care Delivery Symposium on Saturday. All Pediatric Ophthalmology papers are grouped on Sunday.

The general program also featured 11 new members and 3 prospective new members at the podium.

Regarding CME the AOS 2016 program was awarded the full number of CME credits (12 hours) for the scientific sessions, which is the highest number to date for any AOS meeting. This is also the first year that the CME auditor approved everything upon first review and the first year the AOS was granted CME hours for a poster session.

It was my honor and great pleasure to serve as the 2016 Chairman of the Committee on Programs for the American Ophthalmological Society.

PRESIDENT MARILYN B. METS, MD AND LAURENS J. METS, PHD

REPORT OF THE COMMITTEE ON MEMBERSHIP

William Mieler: There were a total of 10 applications for membership into the AOS in 2016. Following a thorough independent review of the 10 applications for membership into the American Ophthalmological Society (AOS), the Committee on Membership (ME Hartnett, Michael Siatkowski Chris Rapuano, William F Mieler), held a conference call on August 22, 2016 to discuss the applicants. Hans Grossniklaus and Amber Mendez also participated in the conference call. Following our preliminary evaluation of the candidates, I then presented summaries of the individual candidates to the Council on Saturday, October 8, 2016.

Of the 10 candidates, one was found to not be eligible, based on a lack of Board Certification. The other 9 individuals were recommended to the Council as candidates for membership, and will be invited to prepare their theses

General demographic data. Five of the nine candidates are male, and eight are nationally based (though two additional candidates initially did complete a portion of their training internationally). Eight candidates are academically affiliated, with one being in private practice. Specialties include cornea/uveitis (4), vitreoretinal (2), glaucoma (2), and pediatric ophthalmology (1). Publications ranged from approximately 25 to in excess of 300, and most of the candidates had various forms of governmental and/or private national funding.

Overall, the candidates were found to be highly qualified and superb. They will be invited to write a thesis, and once this requirement has been met, we will welcome them into the active membership of the AOS, and look forward to their contributions.

2016 AOS COUNCIL (FROM LEFT): MARCO A. ZARBIN, MD, ANNE LOUISE COLEMAN, MD, ANNE LOUISE COLEMAN, MD, PRESIDENT MARILYN B. METS, TIMOTHY W. OLSEN, MD, EMILY Y. CHEW, MD, M. EDWARD WILSON, JR. MD & HANS E. GROSSNIKLAUS, MD

REPORT OF THE ARCHIVIST PHOTOGRAPHER

RALPH C. EAGLE, JR ,MD: I took 1063 digital photographs at the One Hundred Fifty First Annual Meeting of the American Ophthalmological Society held at the Hotel Viking in Newport, Rhode Island on May 14-16, 2015. The photos were taken using a Nikon D800E digital camera. Eight photos were included as color illustrations in the 2015 on-line volume of the TRANSACTIONS

OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY. These include photos of 2014 AOS President Richard P. Mills, MD, President Mills and his spouse Karen Covington and a group photo of The Council. Also included were photos of 2015 Lucien Howe Medalist John G. Clarkson, MD, 2015 Inaugural "Frederick C. Blodi Lecturer" Timothy Olsen,MD and new members Harminder Singh Dua and Janey Wiggs, MD signing the AOS Membership Book.

A photoshow comprising selected digital images in PDF format from the 2015 meeting can be downloaded from the meeting photos section of the *Members-Only* section of the AOS website.

The digital archives of the AOS now comprise more than 10600 high-resolution digital photographs and 1400 digital images prepared from scanned transparencies. Additional slides will be scanned in the future. The images are stored on redundant digital hard drives and flash drive sand on CD's and DVD's in some instances. A backup hard drive containing all the images will be stored in the AOS office in San Francisco.

REPORT OF THE COMMITTEE ON EMERITI

THOMAS D. FRANCE, MD: I want to thank Dr. Ed Wilson for asking me to Chair this committee and to recognize Dr. Froncie Gutman who served as Chair since 2013. In particular I would like to thank Froncie for his excellent advice regarding the requirements of the Chair! I have taken them to heart and hope I can fulfill his suggestions.

The annual Emeritus luncheon will be held today from 12:00 to 1:30 on the West Terrace of the hotel. All Emeritus members, both old and new, and their guests, are invited! We have invited a member of the US Air Force Academy' Speakers Bureau to tell us more about the Academy and he will also be giving a short lecture re the latest information on the last flight of Amelia Ehrhardt.

I regret to inform you of the passing of the following Members since our last Annual Meeting:

George H. Beauchamp, MD	Grapevine, TX	Member since 1995
Donald J. Doughman, MD	Minneapolis, MN	Member since 1980
Barrett G. Haik, MD	Memphis, TN	Member since 1991
James E. McDonald, MD	Chicago, IL	Member since 1971
Irvin Pollack, MD	Baltimore, MD	Member since 1980

COUNCIL APPOINTMENTS FOR 2016-2017

AOS Council – **Julia Haller**
AOS President – **David Wilson**
Executive Vice President – **Hans Grossniklaus** to continue
Editor – **Emily Chew** to continue
Member, Committee on Theses – **Janet Davis** to join Dimitri Azar, Henry Jampel
Member, Committee on Programs – **Jane Weiss** to join David Tse, Eduardo Alfonso, Preston Blomquist.
Member, Committee on Membership – **Anthony Arnold** to join Joel Schuman, Mary Hartnett, R. Michael Siatkowski.
Chair, Committee on New Members – **Evelyn Paysse & David Coats** to continue
Member, Committee on Prizes – **Al Sommer** to join Dan Jones and Hans Grossniklaus
Chair, Committee on Emeriti – **Thomas France**
Committee on Athletics –**Rick Fraunfelder** to continue
Audit Committee – **Jay Erie** to join Richard Parrish III, and incoming EVP, Hans Grossniklaus
Investment Committee – **Marilyn Mets, M. Edward Wilson** and **Hans Grossniklaus**
Archivist/Photographer – **Ralph Eagle** to continue
Representative to AAO Council – **Marco Zarbin** to continue, alternate **Sophie Bakri**
Representative to the International Council of Ophthalmology – **Marilyn Miller** to continue
Representative to the American College of Surgeons – **Robert Goldberg** to join George Spaeth (alternate)
Representative to the Pan American Association of Ophthalmology – **Eduardo Alfonso** to continue
Representatives to the American Orthoptic Council: **Marilyn Mets** to join James Reynolds amd Steven Archer
Representative to JCAHPO – **William Mieler** to continue
Heed Foundation representative: **David Wilson** to continue
Parliamentarian – **Edward Raab** to continue
All were contacted and agreed to serve.

REPORT OF THE REPRESENTATIVE TO THE COUNCIL OF THE AMERICAN ACADEMY OF OPHTHALMOLOGY

MARCO ZARBIN, MD, PHD:

1. Events of the past year: Update
    a. In November 2015, CMS announced it would significantly cut key glaucoma and retinal detachment payments to physicians. Beginning in Nov. 2015, the AAO initiated a 10-month campaign (along with the American Glaucoma Society, American Society of Retina Specialists, American Society of Cataract & Refractive Surgery and Retina Society) to limit Medicare payment cuts for key glaucoma and retinal procedures. 300 ophthalmologists commented on the November 1, 2015 Final Fee Schedule rule.
    b. Medicare 2017 Proposed Physician Fee Schedule: CMS announced their intent to adopt the original RUC recommended cuts per Academy request with an immediate $14 million annual improvement in scheduled payments for Ophthalmology. Cuts were reduced from 34% to 21% and 16% to 4%. A problematic formula that threatened highly utilized ophthalmology codes like cataract and intravitreal injections was blocked.
2. The American Academy of Ophthalmology was one of 10 organizations that sponsored the report issued by the National Academies of Sciences, Engineering and Medicine, "Making Eye Health a Population Health Imperative: Vision for Tomorrow" which focuses on public health approaches to reduce vision impairment and promote eye health. The AAO funded (sponsored) this report for several reasons among which are: 1)move the discussion to data-driven analysis; 2) expand AAO involvement in community- based eye care; 3) support for eye care/research funding; 4) supports valuation of ophthalmologic services
    a. The AAO is evaluating the 9 recommendations that came out of the report. Some benefits/outcomes might include: 1) reprioritizing vision eye health and disease as a priority (research funding, screening benefits, public health programs); 2) potential for public/policy maker attention and re-evaluation of importance of eye health; and 4) potential to move ophthalmology into a leadership position on public health and population eye health.
3. 60 societies (44 state societies and 16 subspecialty/specialized interest societies including AOS) represented on the Council joined the American Academy of Ophthalmology as signatories to the "Comprehensive Guidelines for the Co-Management of Ophthalmic Post-Operative Care (https://www.aao.org/ethics-detail/guidelines-comanagement-postoperative-care). These guidelines were developed by the Academy's Task Force on Co-Management Principles and approved by the Academy's Board after input by the Council and deliberation by the Council both during and after its Spring 2016 meeting.
4. Academy Secretary for Communications discussed the August 2016 launch of the AAO's new Patient Story Telling initiative, which focuses on sharing with the public true stories about ophthalmologists protecting sight and empowering lives. One objective is to engage patients/public and create enhanced awareness of the value medical and surgical eye care. A new story will be shared each month. To learn more about the patients that have been featured to date and/or to see how ophthalmologists can share their patients' stories please visit: https://www.aao.org/eye-health/patient-stories.
5. David Pao, MD was recognized with the Academy's Secretariat for State Affairs "Hall of Fame" award for his long-standing advocacy efforts.
6. From the Council closing session, one of the key highlights was the presentation on Maintenance of Certification. ABO Councilor Debra Shetlar, MD reviewed some changes under progress which, in part, were due to AAO Council input. Future MOC efforts will focus on "continuous certification". In 2017 a pilot alternative exam will be offered that: 1) allows one to answer questions on a quarterly basis; 2) content will be accessible via tablet, phone, or computer; 3) availability for core module credit for PORT or DOCK. The goal is to transition away from a "high stakes" format to a continuous assessment model while maintaining the credibility and rigor of the certificate. If successful, the ABO will add subspecialty sections in the future.
7. From the Subspecialty Society Meetings:
    a. **Episode groupers** are an attempt to bring together all the costs of care around an episode started by what is referred to as "triggering event", most often a procedure or surgery, but the term also can be applied to a combination of codes that can create a triggering event for a chronic condition. Once a trigger event has occurred, a timeframe is specified. All claims data are brought together in a group (e.g., exams, diagnostic codes, labs, post op drugs, ASC/hospital charges, etc.), and are amalgamated into the cost of care. No episode grouper to date includes Part D costs. Dr. Cynthia Mattox, President-Elect of the American Glaucoma Society, stated that the AAO is working with representatives from ASRS, ASCRS, and AGS to continue to deal with episode groupers (previous work has been done by these groups but without a definitive outcome). AAO expects CMS to release a list of groupers in the November 2016 rule. The AAO has provided numerous comments to CMS over the past 3 years of rule-making and RFPs, plans to comment again following the November rule, and plans to continue to participate in episode development. The IRIS Registry may be able to provide better resource use metrics that are linked to quality, and the AAO has communicated that hypothesis to CMS.
    b. Jennifer Lim, MD, the Retina Society AAO Council Representative, discussed the joint campaign between the AAO, the American Society of Retina Specialists, and the Retina Society on the Medicare Part B Drug Demonstration. Dr. Lim explained that the CMS Demonstration project seeks to determine the impact that alternative drug payment strategies would have on providers' prescribing habits. The project consists of 2 phases over 5 years beginning in the fall 2016.
        i. In phase 1, the CMS payment differs by group.
            1. For group 1, the following applies:

a. Add-on to average sales price (ASP) decreases to 2.5% from current 6%.
b. CMS pays ASP + 2.5% ASP + flat $16.80 administrative fee.
c. De facto reduction is actually greater: current 2% sequestration was not factored into payment.

2. Group 2 represents the control group to which CMS continues to pay the ASP plus 6%.

ii. Phase 2 of the project, which will be implemented in January 2017, involves the following:
1. CMS will test the impact of targeted pricing changes to Medicare Part B drugs.
2. CMS currently developing methods (value-based purchasing strategies – decision support tools, reference-drug pricing, and eliminating patient cost sharing) that are similar to those used by commercial health plans, pharmacy benefit managers, hospitals that manage health benefits and drug utilization.

iii. Dr. Lim stated that the Academy, ASRS, and the Retina Society oppose the Medicare Part B Drug Demonstration because it is based on faulty assumptions, including: 1) the assumption that lower cost alternatives are always available (access to Avastin can be problematic given the federal and state regulations on compounding pharmacies and the FDA 5-day beyond use date guidelines); all treatment options are not necessarily interchangeable; 3) physicians are not the sole entity deciding which treatment to use; 4) physicians are not motivated solely by revenue. The ASRS's PAT survey results refute the last assumption. Dr. Lim urged section Councilors and their constituents to contact their Congressional representative about the potential adverse impact on Medicare beneficiaries.

c. Bryan Lee Jr., MD, Councilor representing the American Society of Cataract & Refractive Surgery (ASCRS), discussed the effort of the joint task force on toxic anterior segment syndrome (TASS) prevention and ophthalmic instrument cleaning and sterilization. A task force consisting of representatives from the Academy, ASCRS, and OOSS developed a joint advisory document, *Recommendations Regarding Use of Enzyme Detergent for Cleaning Intraocular Surgical Instruments.* More recently, in August 2016, the three organizations, along with American Society of Ophthalmic Registered Nurses (ASORN), issued a joint statement entitled *Improve Patient Safety and Eliminate a Risk Factor for TASS* which asks industry manufacturers to validate alternatives to enzymatic cleaner and change their directions for use.

d. Louise Mawn, MD, Councilor representing the American Society of Ophthalmic Plastic & Reconstructive Surgery (ASOPRS), discussed the revised rules for blepharoplasty and the collaborative actions that the Academy and ASOPRS have taken to overturn them

8. Global Surgery Data Collection: David Glasser, MD, the AAO's Associate Secretary for Health Policy, reviewed the Global Surgery Data Collection effort.by CMS. He explained the program arose out of CMS's concern that RVUs for surgical codes are inflated by paying more for post-operative visits than actually occur. CMS has proposed eliminating the global periods, a position that the AAO and other stakeholders oppose strongly. Reasons for the opposition include: 1) this plan will create massive disruption in payment and care delivery; 2) no post-op codes or values exist; 3) total reimbursement would collapse by splitting out post-op care; 4) the impetus for data collection is based on statistically flawed OIG data, which should not form the basis for policy decisions; and 5) there is no pilot testing for the program. Dr. Glasser noted that under MACRA, global periods remain for now. CMS is required, however, to put a process in place by January 1, 2017 to gather data from a representative sample of post-operative services provided.

a. The AAO is recommending collaboration with the surgical community to find a better solution for data collection. One suggestion is to conduct the second and third phases *first.* By using the information from those physician surveys and direct observational studies, we would be able to both conduct a workable plan for collecting data from a larger but still select representative sample, and develop guidelines for the interpretation of the data. In addition, rather than reviewing over 250 procedures, the AAO proposes a study of only a subset of procedures. The RUC has proposed criteria to target high volume procedures, which would reduce the number of ophthalmology services to be reviewed from >250 to ~33. The AAO supports the RUC criteria and would work with CMS to develop a more rational coding system to collect the required data on the number and level of post-operative visits. While MACRA requires that a process must be in place, it does not specify that data collection has to begin by January 1, 2017.

REPORT OF THE REPRESENTATIVE TO THE AMERICAN COLLEGE OF SURGEONS

EDWARD L. RAAB, MD, JD: An ACS Governor acts as liaison between the organization represented by the Governor and the Board of Regents of the College for consideration of problems of mutual concern. In addition to the Governors representing specialty societies across the range of surgical fields, others represent geographic regions of the United States and Canada and a number of other countries. Our Society's representative Dr. Edward L. Raab continues to serve on the Board of Governors Patient Education Committee, and on the Ophthalmic Surgery Advisory Council, which provides input to the ACS Board of Regents on matters concerning Ophthalmologist members of the College. He is the Advisory Council's liaison to the Program Committee and has organized a Pane Session, co-sponsored with the Advisory Council for Otolaryngology, entitled "Eyelid and Orbital Masses and Deformities: Diagnosis and Management", for the 2016 Clinical Congress to be held in October. These are topics of wide membership appeal.

The American College of Surgeons has continued its initiative of providing more frequent updating of Governors with information to be shared with their constituents, by means of informational webinars and the circulation of weekly "NewsScopes" discussing various current issues.

Advocacy is another College priority. Advocacy Summits have been held annually in preparation for participants to visit Capitol Hill to express member concerns to federal legislators. Increased funding for emergency medical services to trauma victims continues to be prominent in the College's advocacy efforts. The Division of Health Policy provides information to members about avoidance of penalties under Medicare, and works with insurance companies toward developing alternative payment methods. The ACS has pressed for wider participation, such as by insurers and commercial health care systems, in funding of graduate medical education.

College surveys have shown that many graduating surgery residents do not feel that they are well prepared for practice. Decline in the number of cases during residency because of pre-emption for the training of post-residency fellows, and a decrease in opportunities for progressive assumption of responsibility are important factors in this result.

The College has taken notice of a trend among graduating residents of surgical training programs to seek full time in-hospital employment. A guide has been developed that discusses the issues and strategies of importance to those interested in this type of career.

With the opportunity for membership in a strong American Academy of Ophthalmology, our specialty is a minor presence in the ACS. However, College efforts on issues critical to the future of medical care are relevant to Ophthalmology. There is considerable value in affiliation with a prominent voice in our profession, and ACS membership is encouraged.

REPORT OF THE REPRESENTATIVES TO THE AMERICAN ORTHOPTIC COUNCIL

EDWARD L. RAAB, MD**:** The American Orthoptic Council [AOC] accredits orthoptic teaching programs, examines candidates for certification, sets standards for required continuing education of Certified Orthoptists [CO], and promotes and oversees the knowledgeable and ethical practice of orthoptics.

The Council is comprised of ophthalmologists specializing in pediatric ophthalmology and strabismus, and of certified orthoptists. Our Society's representatives to the AOC during the past year have been Drs. Edward Raab, James Reynolds, and Steven Archer.

During the past year, Dr. Raab served as Chair of the Bylaws and International Affairs Committees and as a member of the Ethics Committee. He will retire from the AOC this year after its Annual Meeting in September, after 35 years of service. The AOC current President will contact the Society to discuss the replacement for Dr. Raab.

Dr. Reynolds served as a member of the Accreditation Committee and as Chair of the Editorial Committee. He is also the current editor of the American Orthoptic Journal.

Dr. Archer, who replaced Society member Dr. Natalie Kerr at the end of 2015, served on the Program, Accreditation, and Long Range Planning Committees.

There are thirteen AOC accredited Orthoptic Programs. The Council continues to review its accreditation renewal process and its criteria for requiring site visits. Additionally, there are a number of short and long clinical rotations with approved partnering clinics in a number of States which increased the Council's capability to afford a varied clinical experience to candidates associated with the St. Catherine University *Bachelor of Science in Orthoptics Program* in Minneapolis, MN. Unfortunately, the St. Catherine's program will close this year. Other teaching programs in Houston, Columbus, and Boston are under consideration, and the Council continues to receive requests for programs in other geographical areas. Confidential surveys of orthoptic students are an important element in the Council's oversight of quality in its teaching programs.

The Council's Annual Meeting and Certifying examinations for 2016 will be held at the Vanderbilt Eye Institute in Nashville in October. Videos of motility disorders will be included in one section of the exam. 27 candidates will take the oral practical exams this year; candidates from AOC accredited programs as well as a number of foreign-trained orthoptists who have been approved to sit the AOC certifying exams. All three of our Society's representatives take part in this vital certification process. Candidates must initially pass a previously administered written examination, now given in electronic format and available at Pearson Vue testing sites in the US and abroad. The Examination Committee is particularly sensitive to accommodating those with handicaps or candidates with other special needs for both the written and the oral/practical exams or candidates with other special needs for both the written and the oral/practical exams

The AOC and the American Association of Certified Orthoptists [AACO] conducted a workshop titled "*Things We Were Never Taught in Training-Lessons from the School of Hard Knocks*" at the Annual Meeting of the American Association for Pediatric Ophthalmology and Strabismus [AAPOS] meeting in Vancouver, April 2016.

This year's AAO/AOC/AACO Sunday Symposium, titled "*Shake, Rattle, and Roll-The Shimmy on Nystagmus*" continues the Council's participation in major meetings. Society member Dr. Natalie Kerr participated in the former offering, and Dr. Michael Siatkowski in the latter. Additionally, Dr. Edward Raab was honored as the 2016 Frank. D. Costenbader Lecturer at the AAPOS meeting.

The new Board of Directors of the American Orthoptic Journal continues to explore the future direction of the Journal, the possible reduction of publishing costs and ways to increase circulation. The commitment to scholarship remains firm. The Journal's Medline recognition has enhanced the standing of this peer-reviewed publication, which celebrated the 75th anniversary of the American Association of Certified Orthoptists with an expanded issue in 2015.

The Council is facing several challenges. As it is not an officially designated credentialing body, its certificate does not allow the clinical activities of a Certified Orthoptists to contribute to "meaningful use". For this and other reasons, the AOC and the AACO are

continuing efforts to obtain official recognition. As a related concern, trademarking the Council logo and the designation of "Certified Orthoptist" [CO] has so far been found to not yet be feasible given this lack of official status.

Your representatives strongly encourage continued support of the American Orthoptic Council and the profession of orthoptics.

REPORT OF REPRESENTATIVE TO THE INTERNATIONAL COUNCIL OF OPHTHALMOLOGY

MARILYN MILLER, MD:At the World Ophthalmological Congress (WOC) in Guadalajara, Mexico, the AOS sponsored a symposium on retinoblastoma. I believe it was very well received. The historic view gave an excellent remembrance of the milestones in diagnosis and treatment of this devastating disease; the pathology talked expanded our knowledge of the diagnosis and prognosis of individuals with retinoblastoma; the point counterpoint presentation on a somewhat controversial areas of treatment was very stimulating and informative; the talk on retinoblastoma in Mexico added an international view to the symposium; and the talks on counselling and genetics reminded us of the issues that families face when confronted with an affected family member.

The participants in the symposium seemed pleased with the outcome and I would recommend that the AOS consider presenting another symposium at some selected international meeting in the future.

Sharing the organization of this symposium with Ed Wilson made the task so much easier. His insights and contributions resulted in a much better symposium than if I had done it alone.

REPORT OF THE REPRESENTATIVE TO THE PAN AMERICAN ASSOCIATION OF OPHTHALMOLOGY

Eduardo Alfonso, MD:

Pan-American Council of University Professors (*PACUPO*)

Eduardo Mayorga MD (Argentina) chairs ***PACUPO***. The purpose of this program is to unite and standardize university training programs throughout Latin American through exchange programs and other means. Dr. Mayorga, as Chair of the PAAO eLearning Committee, launched the PAAO webinars program and many PACUPO members have given educational courses. The complete list of archived webinars and the schedule of upcoming webinars is available on the PAAO's website www.paao.org. Currently PACUPO is collaborating with the American Academy of Ophthalmology to help translate their Preferred Practice Patterns (PPP/s) into Spanish.

Fellowships Committee.

Paulo Augusto Arruda de Mello MD (Brazil) chairs the ***Fellowships Committee***. Scholarships are funded from a variety of sources. Over $125,000 in scholarships and other awards were given out in 2016 and pledged for 2017. In addition to using its Pan-American Foundation unrestricted resources, funding for these programs is provided by personal donations to the Pan-American Foundation, from donations from industry partners and private or family foundations, such as the Retina Research Foundation, the Tim & Judith Sear Foundation and the David E.I. Pyott Foundation.

Visiting Professors Committee

José Antonio Roca MD (Peru) chairs the ***Visiting Professors Committee***. The Visiting Professors Program sends Visiting Professors to present the "Pan-American Lecture" at national ophthalmological meetings in the Americas. Over $25,000 in travel awards were given out to eight national society meetings.

REPORT OF THE REPRESENTATIVE TO THE JCAPO (JOINT COMMISSION ON ALLIED HEALTH PERSONNEL IN OPHTHALMOLOGY)

WILLIAM F. MIELER, MD**:** Special thanks to Lynn Anderson (JCAHPO).

Representative(s)

JCAHPO has a membership of 22 ophthalmology and allied health organizations and has 24 representatives who are JCAHPO Commissioners. Eydie Miller-Ellis, MD, serves as JCAHPO's current President.

Purpose/Mission of the Organization

JCAHPO's mission is:

To enhance the quality and availability of ophthalmic patient care by promoting the value of qualified allied health personnel and by providing certification and education.

IMPORTANT ACCOMPLISHMENTS IN 2015-16

Organization and Governance

- Approved a change our name to the "International Joint Commission of Allied Health Personnel in Ophthalmology" (IJCAHPO) and merging JCAHPO with the current IJCAHPO.
- Endorsed World Health Organization's classifications of eye care health workers and the classification of ***Allied Ophthalmic Personnel (AOP).***
- Launched initiative to build awareness of the ophthalmic assisting profession and to recruit, retain, and train Allied Ophthalmic Personnel.
- Supported the Commission on Accreditation of Ophthalmic Medical Programs to expand and include accreditation of Canadian Ophthalmic Training Programs.
- Appointed a new Public Member to the Board of Directors.

Foundation

- Awarded 217 Program Scholarships totaling $46,260 to support ophthalmic technicians with their academic education.
- Awarded 25 Certification and Continuing Education grants totaling $5,700 to technicians.
- Awarded the 2015 Virginia Boyce Humanitarian Award to Beth Colon, COT, in recognition of her many years of volunteerism.
- Awarded $2,000Harold A. Stein Scientific Paper Award to Sonia Zhu for her paper, "Electrophysiology and Imaging Techniques in the Evaluation of Congenital Nystagmus."
- Conducted resident research with 13 resident programs on the use of simulation in training.

Certification

- Awarded NCCA (National Commission for Certifying Agencies) re-accreditation for the following JCAHPO Programs: Certified Ophthalmic Assistant (COA®), Certified Ophthalmic Technician (COT®), Certified Ophthalmic Medical Technologist (COMT®), and Ophthalmic Surgical Assistant (OSA®).
- Increased the total number of certificants from 22,343 to 24,233 worldwide.
- Awarded 3,126 new certifications to COA, COT, and COMT levels and 4,851 Ophthalmic Scribe certifications.
- Provided JCAHPO Career Advancement Tool (JCAT) quiz online with instant scoring upon completion.
- Implemented new 2017 certification examination content and standards based on Job Task Analysis research.

Education

- Held the 2015 43rd annual meeting held in Las Vegas with 2,287 registered attendees.
- Offered more than 300 online courses on EyeCareCE website.
- Held 11 regional CE programs.
- Presented 36 webinars for technicians.
- Awarded 1,128 CE Providers.
- Increased social media presence on Facebook (9,508 followers, LinkedIn (2,552 followers), Twitter (1,389 followers).
- Developed a series of free online courses for orientation of new eye care staff.

Career Development

- Promoted the 7th Annual AOP week.
- Conducted pilot Ophthalmic Technician recruitment campaign with three state ophthalmology societies: Minnesota, Utah, and Florida. Expanding the campaign to additional states.
- Developed campaign to assist military personnel in transition to consider ophthalmic assisting as a new career.

International Relations

- Attended the OSWI meeting in Barbados; presented Technician courses; and administered the certification examination.
- Conducted an ongoing curriculum review of the COA training program by the Fred Hollows Foundation with PEI (Fiji) and Papua New Guinea; and administered the certification examination.
- Invited to present at the IAPB General Assembly in Durban.
- Invited to present at the WOC 2018 meeting in Barcelona.

Public Affairs

- Collaborated with the Ophthalmic Mutual Insurance Company (OMIC) to publish free video training on risk management practices – eye drop instillation.
- Monitored state legislation that requires credentialing, accredited education, or licensure of any personnel assisting in a surgical theater or ASC.
- Drafted and promoted white paper that outlines and compares ophthalmic surgical assistants with the profession of surgical technicians and surgical technologists

What Is the Value of Representation on JCAHPO?

Our organization's involvement fosters a positive relationship and communications between the two organizations. Opportunities for joint programs are also enhanced.

I recommend that we strongly support and endorse jcahpo's certification and continuing education to our membership and educating our membership on the value and productivity of certified ophthalmic technical staff vs. Non-certified technical staff. The relationship between the two organizations is important to ophthalmologists and i recommend that this continue to be strengthened.

SCIENTIFIC SESSION, SATURDAY, MAY 21, 2016

6. A Comparison Of Outcomes Of Laser Trabeculoplasty Surgery Performed By Optometrists Versus Ophthalmologists In The State Of Oklahoma **Joshua Stein**, Chris Andrews, Gregory Skuta
7. Substantial Over-Prescription Of Antibiotics For Acute Conjunctivitis In The United States Nakul Shekhawat, Roni Shtein, Taylor Blachley, **Joshua Stei**n

8. Value Creation Where Control Meets Complexity: Protocols In Medicine **George Beauchamp**, Russell Gonnering, Cynthia Beauchamp
9. Long-Term Outcome Of Half-Dose Verteporfin Photodynamic Therapy For The Treatment Of Central Serous Chorioretinopathy (An AOS Thesis) **Timothy Y. Y. Lai**, Raymond L. M. Wong, Wai-Man Chan
10. Quantifying Structural And Functional Effects Of Macular Pucker And The Response To Surgery - Beyond Visual Acuity **J. Sebag**, Justin Nguyen, Kenneth Yee, **Alfredo Sadun**
11. Ophthalmic Manifestations Of Amyotrophic Lateral Sclerosis **Nicholas Volpe**, Joseph Simonett, Amani Fawzi, Teepu Siddique

SATURDAY EVENING BANQUET, MAY 17, 2014

REPORT FROM THE COMMITTEE FOR NEW MEMBERS

EVELYN A. PAYSSE, MD & DAVID K. COATS, MD: The New Members Committee welcomed 10 new members and 2 members elected in prior years at the 152nd annual meeting of the American Ophthalmological Society. The new members are Esen K. Akpek, MD, R. V. Paul Chan, MD, John Danias, MD, James Handa, MD, Arif Khan, MD, Timothy Lai, MD, Shahzad Mian, MD, Rona Z. Silkiss, MD, FACS, Jason Slakter, MD, Nick Volpe, MD.

Jason Slakter, MD was unable to attend the meeting. Massimo Busin, MD (2015) and Tamara Fountain, MD (2014) attended their first meeting.

A brief background summary for each new member follows. The background summary for Dr. Busin and Fountain is in report on the 150th and 151st meeting, respectively.

Esen K. Akpek, MD

- Bendann Family Professor of Ophthalmology and Rheumatology at John Hopkins Wilmer Eye Institute.
- Cornea
- Thesis: Donor Corneal Transplantation vs Boston Type 1 Keratoprosthesis in Patients with Previous Graft Failures: A Retrospective Single Center Study.

R. V. Paul Chan, MD

- Professor of Ophthalmology and Visual Sciences; Vice Chair for Global Ophthalmology; Director, Pediatric Retina and ROP Service; and Co-Director, Vitreoretinal Fellowship Program at Illinois Eye and Ear Infirmary, University of Illinois at Chicago.
- Retina
- Thesis: The Global Education Network for Retinopathy of Prematurity (GEN-ROP): Development, Implementation, and Evaluation of a Novel Tele-Education System.

John Danias, MD

- Professor of Ophthalmology and Cell Biology; Vice Chair for Research, Department of Ophthalmology at the University of New York (SUNY) Downstate Medical Center.
- Glaucoma
- Thesis: Can Visual Field Progression be Predicted by Confocal Scanning Laser Ophthalmoscopic Imaging of the Optic Nerve Head in Glaucoma?

James Handa, MD

- Robert Bond Welch Professor at Wilmer Eye Institute, John Hopkins School of Medicine in Baltimore, MD.
- Retina
- Thesis: Lipoprotein(a) with An Intact Lysine Binding Site Protects the Retina From an Age-Related Macular Degeneration Phenotype in Mice.

Arif Khan, MD

- Clinical Professor of Pediatric Ophthalmology, Strabismus, Ocular Genetics at Eye Institute, Cleveland Clinic Abu Dhabi, United Arab Emirates.
- Pediatrics
- Thesis: Phenotypes of Recessive Pediatric Cataract in a Cohort of Children with Identified Homozgous Gene Mutations.

Timothy Lai, MD

- Honorary Clinical Associate Professor Department of Ophthalmology & Visual Sciences at The Chinese University of Hong Kong; and Consultant Ophthalmologist, Hong Kong Baptist Hospital.
- Retina
- Thesis: Long-Term Outcome of Half-Dose Verteporfin Photosynamic. Therapy for the Treatment of Central Serous Chorioretinopathy.

Shahzad Mian, MD

- Associate Professor at University of Michigan/Kellogg Eye Center; Associate Chair of Education; and Residency Program Director.
- Cornea
- Thesis: Dry Eye Disease Incidence Associated with Chronic Graft Versus Host Disease: Non-Concurrent Cohort Study.

Rona Z. Silkiss, MD, FACS

- Silkiss Eye Surgery, Division of Ophthalmic Plastic, Reconstructive and Orbital Surgery at California Pacific Medical Center.
- Plastics
- Thesis: Neuroanatomic Variations in Graves' Dysthyroid Ophthalmology as Studied with MRI.

Jason Slakter, MD

- Vitreous-Retina-Macula Consultants of New York; President of Digital Angiography Reading Center; CEO of OHR Pharmaceutical, Inc.
- Retina
- Thesis: Digital Algorithmic Diabetic Severity Scoring System

Nick Volpe, MD

- The George and Edwina Tarry Professor and Chairman at the Department of Ophthalmology at Northwestern University Feinberg School of Medicine.
- Neuro-ophthalmology
- Thesis: Ophthalmic Manifestations of Amyotrophic Lateral Sclerosis.

NEW MEMBERS (FROM LEFT) DRS. JOHN DANIAS, JAMES HANDA, ARIF KHAN, SHAHZAD MIAN, ESEN K. AKPEK, TAMARA R. FOUNTAIN, RONA SILKISS, R.V. PAUL CHAN, NICHOLAS VOLPE, MASSIMO BUSIN, & TIMOTHY Y.Y. LAI

REPORT FROM THE ATHLETIC COMMITTEE:

FREDERICK FRAUNFELDER, MD**:** On May 21, 2016 awards were presented for outstanding achievement in tennis, golf, fishing and the performing arts. Events were held at the historic Broadmoor Hotel with adjacent golf courses and tennis courts.

In golf, Dorene Shipely won the Ellsworth Trophy for low women's gross, and Miriam Ridley won the Homestead-Calloway Cup for low women's net. Woodford VanMeter won the Mishima-MIchels trophy for men's low gross and Alex Levine won the Canada-McCullough cup for men's low net. Senior low gross, the Truhlsen trophy, went to Paul Lichter and the low men's team Knapp memorial trophy went to Bob Goldberg and Peter Netland.

Fly fishing was a novel event at the Broadmoor where participants had to take a 3 hour drive to a fly-fishing paradise. The McCaslin-Fralick-Kimura trophy for the largest fish was awarded to Daurice Grossniklaus. Also, relatively new to AOS was the choral events as organized by Linda Day. It turns out the West was the best and public honor was bestowed upon the team at the banquet.

Tennis saw the Hughes Bowl go to Tamara Fountain and Francesca Mattone-Volpe trophy while the championship trophy, the Perera Bowl, went to Deena Laties and Marianne Pantin. J. Brooks Crawford won the Wilkinson trophy for a male over 65 who won the most games.

The EVL Brown tray went to Woodford Vanmeter and David Huang for second place and the championship trophy in tennis, the EVL Brown bowl, was awarded to Alfredo Sadun and Rick Fraunfelder.

Another great athletic and social time was had by participants at the Broadmoor and more is to come at the Omni Homestead in Hot Springs, Virginia. Hope to see everybody there in May.

NEW MEMBER TAMARA R. FOUNTAIN, MD SIGNING THE AOS BOOK

REPORT FROM THE COMMITTEE ON PRIZES

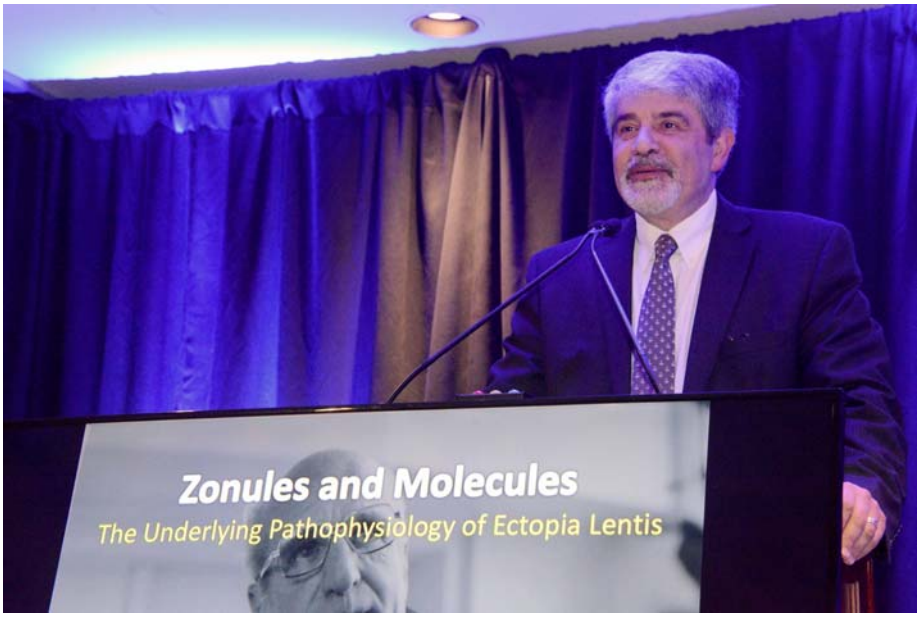
LEE M. JAMPOL, MD**:** The Lucien Howe Medal, the highest honor bestowed by the American Ophthalmological Society (AOS), was given to Susan H. Day, MD, this year. Lucien Howe was born in Maine 186 years ago. He was educated at Bowdoin College, Harvard, and then received his medical degree from Bellevue Hospital. After his training in Europe, he moved to Buffalo, New York, where he established a large practice. He contributed to the dissemination of the use of Crede Prophylaxis to treat Ophthalmia Neonatorum. He served as the President of the AOS and then provided funds for the establishment of the Howe Medal. His other major contribution was the donation of a substantial amount of money to establish the Howe Laboratories at Harvard.

This year, the Prize Committee consisted of Lee M. Jampol, MD, as chair, with Pat Wilkinson, MD, and Dan B. Jones, MD. We each individually reviewed the list of members of AOS. We were aware that non-members were also eligible. We solicited additional nominations from the membership which we then reviewed. For the top potential candidates, we obtained their curriculum vitae.

Voting in stages continued until a winner emerged.

Susan Day, MD, has had a remarkable career. She was raised in Louisiana and attended College and Medical School at LSU. After a year at the Letterman Army Hospital, she did residency training at the Pacific Medical Center in San Francisco, followed by pediatric fellowships in London and Iowa City. She then returned to San Francisco in private practice of pediatric ophthalmology but became the leader of the program at Pacific Medical Center and served as Chairman for many years. During this time she also developed an interest in ethics and became a strong spokesperson for the ethical practice of medicine. Her leadership skills and propensity for hard-work were widely recognized as well as her ability to work with her peers. She ultimately became the president of many national organizations including the AOS, Association of University Professors of Ophthalmology (AUPO), American Academy of Ophthalmology (AAO) and the American Association for Pediatric Ophthalmology and Strabismus (AAPOS). She has served as the Chair of innumerable committees and thus, has made major contributions to almost all aspects of our field. She established herself as a talented speaker, a strong ethical spokesperson, a leader of major organizations, and someone known and beloved by many members of our profession, including most AOS members. Recently, Susan has moved to Chicago where she serves as the Vice President of the Accreditation Council for Graduate Medical Education (ACGME). At our meeting in Colorado Springs, our membership was thrilled to watch Susan receive the prestigious Howe Medal for 2016.

KNAPP SYMPOSIUM PARTICIPANTS ERIC PIERCE, MD, PHD, ALFREDO SADUN, MD, PHD, J.SEBAG, MD, RAFAT R. ANSARI, PHD & JEAN-MARIE A. PAREL, JEAN-MARIE A. PAREL, PHD



FREDERICK C. BLODI LECTURER ELIAS TRABOULSI, MD, MED

2016 LUCIEN HOWE MEDALIST SUSAN H. DAY, MD

SCIENTIFIC SESSION, SUNDAY, MAY 22, 2016

12. Diastolic Blood Pressure And Intraocular Pressure Gene Variants In Relation To Primary Open-Angle Glaucoma **Louis Pasquale**, Hugues Aschard, Jae Kang, Pirro Hysi, **R. Rand Allingham**, Jessica Cooke Biley, **Janey Wiggs**
13. Plus Disease In Retinopathy Of Prematurity: Insights About Expert Diagnosis From Computer-Based Image Analysis **Michael Chiang**, J. Peter Campbell, Esra Ataer-Cansizoglu', Samir Patel, Deniz Erdogmus, Jayashree Kalpathy-Cramer, **James Reynolds**, Jason Horowitz, Kelly Hutcheston, Michael Shapiro, Michael Repka, **R.V. Paul Chan**
14. Role Of Aphakic Rate Of Refractive Growth In Predicting Long-Term Postoperative Refraction After Secondary IOL Implantation In Childhood **M. Edward Wilson**, Rupal H. Trivedi
15. Orbital Sulcus Changes As Determined By Pretarsal Skin Height In Children Treated With Topical Prostaglandin Analogues For Primary Congenital Glaucoma **Deepak Edward**, Mohammed Al Zobidi, E. Randy Craven, Antonio Cruz, Rajiv Khandekar
16. Retinal Thickness And Axial Length **Jost Jonas**, Liang Xu, WenBin Wei, Leonard Holbach, Songhomitra Panda-Jonas, YaXing Wang
17. Management Of Focal Vitreoretinal Traction With Pneumatic Vitreolysis **Clement Chan**, Calvin Mein
18. Long-Term Results Of Two-Piece Microkeratome-Assisted Mushroom Keratoplasty **Massimo Busin**
19. Errors In Retinal Nerve Fiber Layer Thickness Measurements Using Automated Segmentation Of Optical Coherence Tomography **Steven Mansberger**, Brad Fortune, Stuart Gardiner, Shaban Demirel

MEMBERS REGISTERED FOR THE 2016 MEETING.

Members registered for the 2016 meeting. 15 professional guests are at the end of the list

Abbott	Richard	Active Member
Akpek	Esen	Active Member
Alfonso	Eduardo	Active Member
Arnold	Anthony	Active Member
Augsburger	James	Active Member
Bartley	George	Active Member
Bateman	Bronwyn	Active Member
Baudouin	Christophe	Active Member
Black	Bradley	Active Member
Blomquist	Preston	Active Member
Bobrow	James	Active Member
Brodsky	Michael	Active Member
Buckley	Edward	Active Member
Bullock	John	Emeritus Member
Busin	Massimo	Active Member
Cameron	Douglas	Active Member
Cantor	Louis	Active Member
Chan	Clement	Active Member
Chan	Robison	Active Member
Chew	Emily	Active Member
Chiang	Michael	Active Member
Chow	Alan	Active Member
Cibis	Gerhard	Emeritus Member
Coats	David	Active Member
Coleman	Anne	Active Member
Crawford	Brooks	Emeritus Member
Danias	John	Active Member
Day	Susan	Active Member
Eagle	Ralph	Active Member
Edward	Deepak	Active Member
Esmaeli	Bita	Active Member
Feldon	Steven	Active Member
Ferris	Frederick	Active Member
Fish	Gary	Active Member
Flach	Allan	Active Member
Fountain	Tamara	Active Member
France	Thomas	Emeritus Member
Francis	Peter	Active Member
Fraunfelder	Frederick	Active Member
Fraunfelder	Frederick	Emeritus Member
Friedman	Alan	Active Member
Gelender	Henry	Active Member
Godfrey	William	Emeritus Member
Goldbaum	Michael	Active Member
Goldberg	Robert	Active Member
Golnik	Karl	Active Member
Gross	Ronald	Active Member
Grossniklaus	Hans	Active Member
Handa	James	Active Member
Hartnett	Mary	Active Member
Holland	Edward	Active Member
Horton	Jonathan	Active Member
Huang	David	Active Member
Ing	Malcolm	Active Member
Jampol	Lee	Emeritus Member
Jonas	Jost	Active Member
Katz	Jay	Active Member
Kaushal	Shalesh	Active Member
Khan	Arif	Active Member
Kikkawa	Don	Active Member
Kim	Judy	Active Member
Kinyoun	James	Active Member
Lai	Timothy	Active Member
Laties	Alan	Emeritus Member
Levin	Alex	Active Member
Lichter	Paul	Emeritus Member
Liu	Don	Active Member
Ludwig	Irene	Active Member
Mannis	Mark	Active Member
Mansberger	Steven	Active Member
Maumenee	Irene	Emeritus Member
Mazow	Malcolm	Emeritus Member
McCulley	Timothy	Active Member
McLeod	Stephen	Active Member
Mets	Marilyn	Active Member
Mian	Shahzad	Active Member
Mieler	William	Active Member
Miller	Joseph	Active Member
Miller	Marilyn	Emeritus Member
Mills	Richard	Active Member
Mitchell	Paul	Active Member
Nelson	Daniel	Active Member
Netland	Peter	Active Member
Newman	Steve	Active Member
Nork	Michael	Active Member
Olsen	Timothy	Active Member
Parrish	Richard	Active Member
Pasquale	Louis	Active Member
Paysse	Evelyn	Active Member
Raab	Edward	Active Member
Ravin	James	Active Member
Robin	Alan	Active Member
Runge	Paul	Active Member
Sadun	Alfredo	Active Member
Sarraf	David	Active Member
Schuman	Joel	Active Member
Schwab	Ivan	Active Member

Schwartz	Daniel	Active Member
Sebag	Jerry	Active Member
Sergott	Robert	Active Member
Sherwood	Mark	Active Member
Shields	Jerry	Active Member
Shields	Carol	Active Member
Siatkowski	Michael	Active Member
Silkiss	Rona	Active Member
Small	Kent	Active Member
Spaeth	George	Active Member
Spencer	Rand	Active Member
Spivey	Bruce	Emeritus Member
Stein	Joshua	Active Member
Stout	Timothy	Active Member
Summers	Gail	Active Member
Thompson	John	Active Member
Traboulsi	Elias	Active Member
Tsai	James	Active Member
Tse	David	Active Member
Tychsen	Lawrence	Active Member
VanMeter	Woodford	Active Member
Volpe	Nicholas	Active Member
Wallace	David	Active Member
Weiss	Jayne	Active Member
Wiggs	Janey	Active Member
Wilkinson	Charles	Emeritus Member
Wilson	David	Active Member
Wilson M.	Roy	Active Member
Wilson	Sloan	Emeritus Member
Yeatts	Patrick	Active Member
Zacks	David	Active Member
Zarbin	Marco	Active Member

Professional Guests

Blodi	Christopher	Professional Guest
Chan	Nongnart	Professional Guest
Correa	Zelia	Professional Guest
Damato	Bertil	Professional Guest
Giaconi	Joann	Professional Guest
Gupta	Neeru	Professional Guest
Leiderman	Yannek	Resident/Fellow
Lobo	Ann-Marie	Professional Guest
Mets-Halgrimson	Rebecca	Professional Guest
Rocha	Karolinne	Professional Guest
Sadda	SriniVas	Professional Guest
Shekhawat	Nakul	Professional Guest
Stout	Ann	Professional Guest
Thiel	Cassandra	Professional Guest
Waring, IV	George	Professional Guest

PAPER ABSTRACTS

TNFALPHA INDUCED CHOROIDAL NEOVASCULARIZATION INHIBITED BY ACTIVE RAP1 GTPASE

Haibo Wang, Mary Elizabeth Hartnett

Purpose: When activated choroidal endothelial cells (CECs) migrate into the retina in neovascular age-related macular degeneration (AMD), vision loss invariably occurs. We explored crosstalk between inflammatory and oxidative mechanisms involved in CEC activation and tested the hypothesis that tumor necrosis factor alpha (TNFalpha)-mediated CEC migration and choroidal neovascularization (CNV) were inhibited by activation of guanosine triphosphatase (GTPase), Rap1.

Methods: CECs were isolated from de-identified donor human eyes in accordance with University of Utah Human Studies, expanded and cultured through passage 5 for experimentation. CECs were stimulated with TNFalpha, vascular endothelial growth factor (VEGF), or phosphate-buffered saline (PBS) control, and cells or lysates analyzed for reactive oxygen species (ROS), active Rac1, or CEC migration. In some experiments, CECs were 1) treated with antioxidant, apocynin, the Rap1 activator, 2'-O-Me-cAMP (8CPT), or PBS; 2) transfected with small interfering RNA (siRNA) to nicotinamide adenine dinucleotide phosphate-(NADPH) oxidase subunit, p22phox, or control siRNA; or 3) infected with adenoviral-activated Rap1a (adRap1a) or adenoviral-green fluorescent protein (adGFP) control. Six-week old C57Bl/6 mice underwent laser (MicronIV, Phoenix) and were treated with TNFalpha antibodies, 8CPT, or controls. Lectin-stained choroidal flat mounts were analyzed for volume of CNV using confocal microscopy.! Statistics were analyzed by ANOVA.

Results: Compared to PBS, CECs stimulated with TNFalpha or VEGF had significantly greater migration ($p<0.01$). Compared to respective controls, p22phox siRNA reduced TNFalpha-induced ROS, active Rac1, and apocynin reduced CEC migration (all $p<0.05$). Compared to PBS or adGFP, 8CPT or active Rap1 inhibited ROS, active Rac1, and CEC migration induced by TNFalpha. Either TNFalpha antibody or 8CPT inhibited laser-induced CNV compared to controls.

Conclusion: These results support the hypothesis that TNFalpha-induced ROS mediate CEC migration through Rac1 and that activation of Rap1 by chemical or gene therapy inhibits TNFalpha-induced CEC migration. These results support additional investigation into Rap1 as a potential therapeutic in CNV.

OPTICAL COHERENCE TOMOGRAPHY ANGIOGRAPHY OF THE PERIPAPILLARY RETINAL CIRCULATION IN GLAUCOMA

David Huang, Yali Jia, Liang Liu, Beth Edmunds, Lorinna Lombardi, Ellen Davis, Hana Takusagawa, John C. Morrison

Purpose: To evaluate the peripapillary retinal circulation in glaucoma.

Methods: Glaucoma and normal control participants are enrolled in a prospective observational study at the Casey Eye Institute according criteria defined by visual field (VF) and optic disc appearance. One eye of each participant was imaged using a high-speed (70 kHz) 840 nm wavelength spectral optical coherence tomography (OCT) system (RTVue-XR, Optovue). The optic disc region was scanned twice using a 3x3 mm volumetric angiography scan. The split-spectrum amplitude decorrelation angiography (SSADA) algorithm was used to compute 3D angiograms. En face retinal angiogram was obtained by maximum flow projection. The peripapillary flow index was defined as the average decorrelation value in the peripapillary region, defined as a 700-micron wide elliptical annulus around the disc. The peripapillary vessel density was the percentage area occupied by vessels.

Results: The study included 12 glaucoma and 12 age-matched normal participants. The retinal vascular network around the disc was visibly attenuated in glaucomatous eyes and focal capillary dropout could be detected. The flow index in the glaucoma group was 0.066 Â± 0.012 (mean Â± SD), which was lower ($P=0.001$, Mann-Whitney U test) than normal (0.082 Â± 0.007). The vessel density in the glaucoma group was 80.6% Â± 11.1%, which was lower ($P<0.001$) than normal (93.0% Â± 2.8%). Both flow index and vessel density were highly correlated (Pearsonâ??s R = -0.808 and -0.835, $p<0.001$) with VF pattern standard deviation in the glaucoma group. The area under the receiver operating curve for differentiating healthy and glaucoma participants was 0.892 for flow index and 0.938 for vessel density.

Conclusion: Using OCT angiography, glaucomatous reduction in peripapillary retinal perfusion could be visualized as focal defects and quantified as flow index and vessel density with high diagnostic accuracy. Quantitative OCT angiography is potentially useful in glaucoma evaluation.

OCT EVALUATION OF SUBRETINAL VESSEL LOCATION IN POLYPOIDAL CHOROIDAL VASCULOPATHY (PCV) AND RESPONSE OF HEMORRHAGIC AND EXUDATIVE PCV TO HIGH DOSE ANTIANGIOGENIC THERAPY

Gregg T Kokame

Purpose: The purpose was to test two primary hypotheses: 1) Is polypoidal choroidal vasculopathy (PCV) a subretinal neovascular process, rather than a choroidal vascular anomaly? 2) Is a higher dose of ranibizumab (2.0 mg/0.05ml) more effective in PCV than the current dose (0.5 mg/.05 ml) approved for age-related macular degeneration (AMD)?

Methods: Prospective evaluation of PCV in 104 eyes of 86 patients with ICG+OCT localizing the branching vascular network and the polyps. 19 eyes of 19 patients with active leaking and exudation underwent a prospective open-label trial of monthly high-dose intravitreal ranibizumab (2.0 mg per 0.5 ml). The primary outcomes were prevention of major vision loss (> or = 15 ETDRS letters). Secondary outcomes included adverse events, improved vision, and changes in subretinal hemorrhage, subretinal fluid, macular edema, and polypoidal complexes at 6 months.

Results: The PCV vessels were localized beneath the retinal pigment epithelium (RPE) and above Bruch's membrane in 103 of 104 eyes (99%). In the high dose ranibizumab trial at 6 months none of the patients lost > or =15 letters in visual acuity, and 26% (5/19 eyes) gained > or = 15 letters. Decreases were noted in subretinal fluid in 14/17 eyes (82%), subretinal hemorrhage in12/12 eyes (100%), RPE detachment in 14/16 eyes (88%), macular edema in 11/12 eyes (92%), and polyps in 15/19 eyes (79%).

Conclusion: PCV vessels are a subtype of subretinal neovascularization located above Bruch's membrane and below RPE. High dose ranibizumab (2.0 mg/0.05ml) decreased exudation and hemorrhage, and resulted in significant polyp regression, although branching vascular networks persisted.

NAILFOLD MICROVASCULAR ABNORMALITIES IN PRIMARY OPEN-ANGLE GLAUCOMA

Louis R. Pasquale, Aiai Ren, Akiko Hanyuda, Jae Hee Kang, Michael Giovingo, Paul Knepper

Purpose: There is considerable evidence for systemic vascular dysfunction in primary open angle (POAG). Since the pre-capillary arteriole-to-venous connection is more readily visible in the nailfold compared to the optic nerve head, we performed nail fold capillary video microscopy to directly observe the nature of vascular dysfunction in POAG.

Methods: We performed nailfold capillary video microscopy on the fourth and fifth digit of the non-dominant hand using a JH=1004 capillaroscope. We enrolled 209 POAG patients (including 28 with normal tension glaucoma) and 165 control subjects from four sites. Videos were placed in cloud storage for viewing by masked observers, who graded them for hemorrhages, dilated capillary loops >50 microns and avascular zones > 200 microns. Multivariable odds ratio (ORs) of POAG and glaucoma severity (based on a visual field score from 1 to 4) with associated 95% confidence intervals were obtained from logistic and ordinal regression analysis, respectively.

Results: After controlling for demographic factors, family history of glaucoma, systemic disease and use of anticoagulants, for each 100 nailfold capillaries sampled, avascular zones > 200 microns (OR = 4.20 (1.35-13.11); p=0.01) and hemorrhages (OR = 1.53 (1.31-1.83); p<0.001) were associated with POAG. Furthermore nailfold hemorrhages were also associated with incremental glaucoma severity based on visual field scoring (OR = 1.23 (1.11-1.36); p<0.001). Avascular zones > 200 microns were not associated with glaucoma severity (OR=1.36 (0.95-1.93); p=0.09). The number of dilated capillary loops >50 microns was only weakly associated with POAG (OR=1.12 (0.99-1.27); p=0.08) and not associated with glaucoma severity (OR=1.04 (0.93-1.17); p=0.47).

Conclusion: These data provide insight into the nature of non-ocular capillary bed abnormalities in POAG. Whether similar abnormalities occur in relevant ocular tissues needs to be determined.

SPATIAL DISTRIBUTION OF VISUAL FIELD LOSS FOR DIABETIC RETINOPATHY AND GLAUCOMA USING AN IPAD VISUAL FIELD SCREENING TEST

Alan L. Robin, Chris A. Johnson, Suman Thapa

Purpose: To determine the spatial characteristics and frequency of visual field (VF) deficits using a free iPad application, Visual Fields Easy (VFE), in screening normal and glaucomatous Nepalese at the Tilganga Eye Hospital, Kathmandu.

Methods: The VFE iPad app, presents 88 Goldmann size V targets (22 per visual field quadrant) at a16 dB intensity on a 31.5 apostilb (10 cd/m2) background. A red fixation point is presented at one corner of the display (located 33 cm in front of the observer) and test locations are presented (200 msec duration) at various locations in the quadrant and then the red fixation point moves to another corner of the display (the next quadrant). SITA 24-2 Standard tests were used for comparison. We evaluated 210 normal control, 183 glaucoma, and 18 eyes with diabetic retinopathy. We compared the number of missed points on screening with the number of locations outside normal limits for the SITA Total Deviation (TD) and Pattern Deviation (PD).

Results: The number of missed test locations for the VFE demonstrated a good correlation (r=0.79) with the SITA Standard Mean Deviation (MD) and Pattern Standard Deviation (PSD) values (r=0.60). In all tested, VFE found no difference in the frequency of VF deficits in different quadrants, while in glaucoma eyes, SITA found a slightly greater proportion of deficits in the nasal visual field. The average testing time for VFE was 3.3 minutes. There were approximately twice as many locations outside normal limits for TD compared to the screening test, but PD abnormalities were similar to the screening results, indicating that mild deficits were not detected by the screening procedure.

Conclusion: VFE is a relatively effective procedure for perimetric population screening. These findings provide a basis for developing platforms and probability values that can be used for refined adaptive screening.

TRABECULECTOMY SLOWS OR REVERSES THE RATE OF VISUAL FIELD DECAY FROM GLAUCOMA

Joseph Caprioli, John Mark De Leon, Parham Azarbod, Esteban Morales, Andrew Chen, Kouros Nouri-Mahdavi, Abdelmonem Afifi, Anne L. Coleman

Purpose: To investigate alterations in visual field (VF) rates of decay in glaucoma patients after trabeculectomy.

Methods: This is a retrospective study of open-angle glaucoma patients who underwent trabeculectomy with mitomycin-C. Inclusion criteria included â?¥ 4 reliable VFs before and after trabeculectomy and a minimum of 2 years follow-up prior to and after trabeculectomy. A pointwise exponential regression model was used to measure VF decay rates at every test location before and after surgery; these were assigned to either a fast or slow component of VF decay for each eye. Fast and slow component rates for each VF location were calculated before and after trabeculectomy.

Results: Seventy three eyes (64 subjects) met the inclusion criteria and were followed (mean Â± SD) for 5.1 Â± 2.1 years before and 5.4 Â± 2.3 years after surgery, with 8.9 Â± 4.7 VFs before and 9.0 Â± 4.4 VFs after surgery. The mean intraocular pressures (IOP) were 14.7 Â± 3.3 and 10.0 Â± 3.2 mmHg before and after surgery, respectively (p<0.001). The mean rate of the fast component of VF decay changed from -8.3 Â± 12.8 %/year before to -0.5 Â± 8.3 %/year after surgery (p<0.001). The slower component mean rate changed from +4.4 Â± 8.7 %/year before to -0.1 Â± 8.6 %/year after surgery (p=0.002). For test locations belonging to the fast component, there were more improving VF locations after surgery (53%) compared to before surgery (13%, p<0.001). Compared to a glaucomatous non-operated comparison group (with a â??mockâ?? su! rgery date in the middle of follow-up), there were significantly more locations that decayed pre-operatively and improved post-operatively after trabeculectomy (p<0.001).

Conclusion: Trabeculectomy significantly decreases the rate of VF decay in open-angle glaucoma. This slowing is particularly robust for the fast VF decay component. There is evidence of significant and sustained improvement of visual sensitivities after trabeculectomy.

LONG-TERM DEVELOPMENT IMPROVEMENT IN CHILDREN WITH NEUROBEHAVIORAL DISORDERS FOLLOWING PHOTOREFRACTIVE KERATECTOMY FOR ISOAMETROPIC AMBLYOPIA

Evelyn A. Paysse, Charity Grannis, Lingkun Kong, Bryan Whitlow, Catherine Achim, Daniel Wang, Mitchell Weikert, David K Coats

Purpose: To assess the long-term impact of photorefractive keratectomy (PRK) correction of severe isoametropia on the development of children with neurobehavioral problems.

Methods: This is a prospective, interventional case series. Children with neurobehavioral disorders and severe isoametropia unwilling or unable to tolerate using refractive correction underwent PRK. Developmental status was evaluated preoperatively and at 6, 12, 24 and 36 months posoperatively. The main outcome measure was the developmental quotient (DQ). Secondary outcome measures were uncorrected visual acuity, refractive error, and cycloplegic refraction.

Results: Fifteen children aged 4-11 years were included. Twelve were myopic (-9.8 +/- 3.9D), two hyperopic (+5.8 +/- 0.4D) and one astigmatic (+3.5D). Significant DQ improvement was found in receptive, expressive and written communication (p=0.001, 0.05, 0.04 respectively), domestic daily living skills (p=0.03) and interpersonal socialization skills (p=0.02) for the first 12 months, which then plateaued. Improvement in visual perception and motor coordination occurred at 36 months postoperatively. Uncorrected visual acuity improved after PRK (logMAR +1.25 +/- 0.6 to +0.55 +/- 0.4). Mean spherical equivalent refractive error was significantly improved at 6 and 36 months at -0.6 +/- 1.5D and -1.7 +/- 2.2D for the myopic group, +1.4 +/- 1.1D and +2.0 +/- 1.1D for hyperopic group and +1.6 +/- 0.5D and +2.4 +/- 0.2D for the astigmatic patient.

Conclusion: In addition to improvement in visual acuity and refractive error, PRK in children with neurobehavioral disorders and severe isoametropia results in long-term improvement in development, social skills and communication. This translates into an improvement in the quality of life of these severely impaired children.

QUANTITATIVE ULTRASONOGRAPHY OF VITREOUS CORRELATES WITH CONTRAST SENSITIVITY AND VFQ VISUAL QUALITY OF LIFE ASSESSMENT IN PATIENTS WITH FLOATERS

J. Sebag, Jonathan Mamou, Christianne A. Wa, Kenneth M.P. Yee, Ronald H. Silverman, Jeffrey A. Ketterling, Alfredo A. Sadun, D. Jackson Coleman

Purpose: The clinical evaluation of floaters lacks quantitative assessment of vitreous structure. This study developed quantitative ultrasonography (QUS) to measure vitreous echodensities in patients with floaters. Since floaters reduce contrast sensitivity (CS) and visual quality of life (VFQ), it is hypothesized that QUS will correlate with CS and VFQ in patients with floaters.

Methods: 22 eyes of 22 subjects (age = 57+/-19 years) with floaters were evaluated with Freiburg Acuity Contrast Testing (CS; %Weber) and Visual Function Questionnaire (VFQ). Ultrasonography used a customized probe (15MHz, 20mm focal length, 7mm aperture; Quantel Medical) with longitudinal and transverse scans taken in primary gaze and a horizontal longitudinal scan through the premacular vitreous in temporal gaze. Each scan set had 100 frames of log-compressed envelope data. Within each frame, two regions of interest (ROIs) were analyzed (whole-central and posterior vitreous) to yield parameters (energy, E; mean amplitude, M; and percentage of vitreous filled by echodensities, P50) averaged over the 100-frames. Spearmans R evaluated E, M, and P50 correlations with CS and VFQ.

Results: 10 eyes from 10 additional subjects showed good reproducibility ($R>0.828$) for all QUS indices. In the 22 eyes with floaters, CS ranged from 1.19% Weber to 5.59% Weber. All QUS parameters (E, M, P50) correlated with CS ($R>0.67$, $p<0.001$), and notably, P50 had $R=0.867$ ($p<0.001$). Correlations of QUS with VFQ ranged from $R=0.52$ ($p<0.013$) to $R=0.65$ ($p<0.001$) for the different QUS parameters and vitreous ROIs.

Conclusion: Quantitative ultrasonography (QUS) in patients with floaters provides objective, reproducible measures of vitreous echodensity that correlate with contrast sensitivity and quality of life, providing objective assessment of vitreous structure underlying the functional disturbances induced by floaters. By quantifying disease severity, this approach should facilitate surgery case selection and have great utility in quantifying the response to surgery as well as new forms of therapy, such as pharmacologic vitreolysis.

THE CECOCENTRAL SCOTOMA: A NEURO-OPHTHALMIC UPDATE

Steven A. Newman

Purpose: Central scotoma is the typical defect in neuro-ophthalmology. Lawton Smith studied 65 patients with cecocentral scotomas. Optic neuritis was followed by toxic, and genetic. Since 1979 VF (kinetic perimetry and tangent screen) is now done with automated static perimetry. Macula pathology is a frequent cause of central scotomas. When large enough to involve the blind spot they may look cecocentral. We have retrospectively analyzed central and cecocentral scotomas seen at the UVA studied with automated static perimetry.

Methods: A retrospective study of 193 patients referred to the Neuro-Ophthalmology Division at UVA and coded for central and cecocentral scotomas. Patterns were analyzed. Foveal sensitivity was available on all fields. Most patients were studied with a 10-2 program (+ 24-2) and some patients had V size as well as III size test object.

Results: Twenty-nine charts were excluded for transient central scotomas, arcuate, or paracentral defects (14 were unknown). Of remaining 150 patients, 80 macular pathology, (67 macula and 13 with retinovascular disease). Of primary optic nerve pathology, optic neuritis and compressive optic neuropathies were the most common, followed by AION, neuroretinitis, neuromyelitis optica, and traumatic optic neuropathy. There were 2 cases of Leberâ??s, 1 case of dominant optic atrophy,2 cases of nutritional optic neuropathy, and 1 case of toxic.

Conclusion: In spite of a selective referral bias (often retina to neuro-op) retinal disease was still the most common cause of central and cecocentral scotomas. OCT has helped distinguish macula pathology from optic nerve pathology. Even when the macula looked normal, functional studies could demonstrate underlying physiologic pathology. The use of the 10-2 program (+/-a V size test object) was often necessary to recognize the pattern. Even the classic toxic, metabolic, and hereditary optic neuropathies may involve central fixation without extension to the blind spot, calling into question the classical teaching underlying cecocentral scotoma.

USE OF THE AMERICAN BOARD OF OPHTHALMOLOGYS MAINTENANCE OF CERTIFICATION PROGRAM TO MEET REGULATORY AND QUALITY REQUIREMENTS

David Wilson, Michael Siatkowski, John Clarkson

Purpose: To evaluate if a modification of the American Board of Ophthalmologys (ABO) Maintenance of Certification (MOC) process is suitable to meet The Joint Commissions (TJC) Ongoing Professional Provider Evaluation (OPPE) requirement and the OHSU institutional requirement for a quality monitoring and improvement program.

Methods: For the past year clinical faculty at the Casey Eye Institute were provided a list of charts conforming to the requirements of the ABOs practice improvement module (PIM), specific for their area of practice. This length of time corresponds to two OPPE cycles, and four cycles for OHSU quality reporting cycles. The faculty abstracted the information from the assigned charts to complete the requirements of the PIM. The abstracted data was compared to predetermined metrics to assess for gaps in care that would be relevant to the OPPE process and the institutional quality program.

Results: During the first OPPE cycle faculty performance fell below the predetermined metric in the following areas: 1) informed consent for ptosis surgery, 2) graft clarity in keratoplasty for corneal edema, 3) preoperative eye position measurement in surgical treatment of esotropia, 4) counseling for vitamin usage in age related macular degeneration, and 5) performance of neuro-imaging in optic neuritis. All of these gaps in performance were remedied in the second OPPE cycle, but other performance deficiencies were noted.

Conclusion: The modified ABO PIMs were very useful as a program to meet OPPE and Institutional Quality Requirements. The PIMs have the advantage of having been rigorously and professionally developed by the standard setting organization for Ophthalmology.

DEFECTIVE EPITHELIAL BASEMENT MEMBRANE REGENERATION, MYOFIBROBLASTS, AND SCARRING IN THE CORNEA AFTER PRK IN RABBITS

Steven E. Wilson

Purpose: To examine mechanisms related to defective regeneration of the epithelial basement membrane (EBM) that has been shown to underlie the development of corneal scarring (haze) after photorefractive keratectomy (PRK).

Methods: Transmission electron microscopy (TEM) was used to monitor regeneration of the lamina lucida (LL) and lamina densa (LD) of the EBM in rabbits after moderate PRK (-4.5D) that does not produce haze and high PRK (-9D) that produces haze in 100% of rabbit corneas. Laser capture-reverse transcription polymerase chain reaction (RT-PCR) was used to measure mRNA production for the EBM components nidogen-1 and perlecan in the anterior stroma of corneas that had -4.5D PRK or -9D PRK.

Results: TEM showed that LL/LD regenerated on average at 9.5 days after -4.5D PRK, but had not regenerated by 3 months after -9D PRK. Laser capture RT-PCR showed that nidogen-1 and perlecan mRNAs were produced by anterior stromal cells (primarily corneal fibroblasts and keratocytes) during the days leading up to and after regeneration of the LD/LL. Conversely, in corneas that had -9D PRK, that develop haze, little nidogen-1 or perlecan mRNA was produced by anterior stromal cells (primarily myofibroblasts and precursors associated with the haze) up to one month after surgery.

Conclusion: The EBM, the critical regulator of epithelium-derived TGFÎ² that drives myofibroblast development in the stroma, does not regenerate fully in corneas that develop haze after PRK. This study suggests that the anterior stromal cells in corneas that develop haze (primarily myofibroblasts and their precursor cells) do not produce sufficient nidogen-1 or perlecan needed to regenerate LL/LD of the EBM. We hypothesize that the larger wave of stromal keratocyte apoptosis after higher PRK corrections leads to diminished anterior keratocytes to provide critical EBM components and, therefore, allows ongoing penetration of TGFÎ² from the epithelium to drive generation and persistence of the haze-associated myofibroblasts.

THE POWER OF SAMPLE SIZE IN UNDERSTANDING FLAP STRIAE AS A RISK FACTOR OF LOW INCIDENCE IN REFRACTIVE SURGERY

Ronald R. Krueger, Minoru Tomita

Purpose: To correlate climatic change to the monthly incidence of flap striae requiring flap lift after LASIK performed at a single high volume center

Methods: Data on all LASIK cases performed at the Shinagawa LASIK Center in Tokyo between June 2007 and April 2012 was reviewed by month for total number of LASIK cases and striae requiring flap realignment. Statistical analyses were then performed to determine any significant differences in incidence by month, season, and year. Using data from the Japan Meteorological Agency (http://www.jma.go.jp/jma/indexe.html), average monthly humidities and temperatures for the same time were obtained and compared to monthly realignment rates.

Results: For the period reviewed, 614,340 eyes had LASIK surgery at Shinagawa LASIK Center of Tokyo. Of these, a total of 5,244 developed striae requiring realignment, a cumulative incidence of 0.85%. Averaged for all years, the monthly incidence ranged from 0.657% to 1.006%. The lowest monthly incidences were noted in the summer months (June-August), which was statistically significant for the summer season ($p<.05$). Comparison of the average monthly humidity and temperatures to the average monthly incidence of macrostriae for the years 2008 to 2011 revealed a strong inverse correlation for each ($R = -.902$, $R = -.888$).

Conclusion: Due to the very high sample size, the 0.85% cumulative incidence represents a number that experienced surgeons can use as a metric to assess their own flap striae rates. The reported lower incidence during the summer months is the first time that climatic

change has been statistically correlated to flap striae rate, which although different is too low to change practice patterns. The strong inverse correlation with seasonal temperature and humidity may point to air moisture providing a protective effect against post-LASIK dryness and subsequent eye rubbing.

A COMMON POAG RISK VARIANT OF THE GENE SIX6 IS ASSOCIATED WITH REDUCED SUPERIOR AND INFERIOR RETINAL NERVE FIBER LAYER (RNFL) THICKNESS IN NON-GLAUCOMATOUS ASIAN SUBJECTS

R. Rand Allingham, Michael A. Hauser, Eranga Vithana, Tin Aung, Ching-Yu Cheng

Purpose: POAG is a complex inherited trait. Recently, a common genetic variant of the gene SIX6, rs33912345 (Asn141His), has been identified that is highly associated with POAG-risk. This variant affects optic nerve and eye development in the zebrafish model. It is also associated with reduced RNFL thickness in POAG cases. We examined the effect of this common, functional genetic variant on RNFL thickness in the Singapore Chinese population.

Methods: Study subjects were enrolled in the IRB-approved Singapore Chinese Eye Study (SCES), a population-based survey of Singaporean Chinese aged 40 years or older. Subjects underwent a comprehensive ocular examination according to a standardized protocol. SD-OCT was used to measure RNFL thicknesses. Genotyping of SIX6 rs33912345 (Asn141His) was performed using the Illumina exome array.

Results: A total of 1,222 subjects without glaucoma (mean age: 55.0Â±7.4 years) with genotype data and SD-OCT images were analyzed. The allele frequency of the risk variant was 80%. Each rs33912345 risk allele was associated with a 1.34 um decrease in mean RNFL thickness, after adjusting for age, sex, and axial length (P=0.003). The strongest association was observed in the superior and inferior RNFL quadrants ($P < 0.001$ and 0.003, respectively). There was no significant difference in RNFL thickness in the nasal and temporal quadrants.

Conclusion: The very common, functional SIX6 POAG-risk variant, rs33912345, is associated with a global reduction in RNFL thickness that is confined to the superior and inferior quadrants in the Asian population without glaucoma, regions usually affected early in glaucomatous optic neuropathy. This suggests that this variant increases risk of POAG but also reduces RNFL thickness in a large number of persons that will never develop glaucoma. Further studies are needed to determine if this effect on RNFL thickness occurs in other populations and how this confers increased risk for POAG.

PARTIAL MUSCLE RECESSION FOR SMALL-ANGLE VERTICAL STRABISMUS

Steven M. Archer, Catherine S. Choi, Jasleen K. Singh

Purpose: To evaluate vertical rectus muscle partial tendon recession for treatment of small vertical deviations.

Methods: This is an institutional retrospective consecutive series of 56 recessions of one pole of one or two vertical rectus muscles in 47 patients performed by one surgeon; 4 patients/procedures were excluded for lack of follow-up data. Preoperative deviation, change and residual deviation and the PD/mm surgery were evaluated. Separate analyses compared outcomes in patients with Graves eye disease and those in whom the operated muscle had previous surgery.

Results: The mean vertical deviation preoperatively was 4.6 PD (SD 2.0 PD) and postoperatively was 0.0 PD (SD 2.4 PD), $p < 0.0001$. The distribution of observed surgical responses in PD/mm was not Gaussian, but instead was sharply peaked at the mean of 1.5 PD/mm. With regard to vertical deviation, 64% were orthophoric post-operatively and only 7/43 patients required prism or additional surgery after their initial surgery. 60% of Graves patients were orthophoric post-operatively versus 65% of non-Graves patients. 29% of patients who had previous surgery on the operated muscle were orthophoric versus 69% of those who did not.

Conclusion: For patients with small vertical deviations who reject prism spectacles, partial tendon recession is an alternative to previously described partial tenotomy, mini-tenotomy and mini-plication procedures. There is no significant difference in outcomes between patients with or without Graves eye disease; however, muscles with previous surgery are less predictable.

TRANSFORMATION OF BENIGN CHOROIDAL NEVI TO MALIGNANT MELANOMAS: AUTHORITATIVE PRONOUNCEMENTS VERSUS SCIENTIFIC EVIDENCE

James J. Augsburger, Zelia M. Correa

Purpose: Some small melanocytic choroidal tumors diagnosed as nevi by experienced clinicians enlarge during post-baseline follow-up. Many clinicians advise such patients that their previously documented benign choroidal nevus has transformed into a malignant melanoma. The purpose of this paper is to show that growth of a clinically diagnosed choroidal nevus is unreliable evidence of malignant transformation of that tumor.

Methods: Retrospective analysis of 8 patients with a clinically diagnosed choroidal nevus versus melanoma [tumors most clinicians would classify either as a suspicious choroidal nevus or small choroidal melanoma] whose tumor was biopsied at baseline, shown to be a nevus or paucicellular spindle cell tumor by cytology and class 1 tumor by gene expression profile testing, monitored periodically without treatment following the biopsy, documented to enlarge following the biopsy, and then re-biopsied. The tumors increased in size by an average of 1.0 mm in largest basal diameter (extremes 0 to 3.5 mm) and 0.8 mm in thickness (extremes 0 to 2.3 mm) during a median follow-up of 7.5 months (extremes 5.5 to 39 months).

Results: Re-biopsy showed each tumor in this series to have similar cytopathologic features after growth and a persistent class 1 gene expression profile.

Conclusion: Many benign choroidal nevi that enlarge after initial documentation are still benign nevi after that growth, and gene expression profile transformation from class 1 to class 2 appears to be uncommon in such tumors. Based on this evidence, it is inappropriate to equate enlargement of a clinically diagnosed choroidal nevus with malignant transformation of that lesion.

MODELING AND OPTIMIZATION OF CLINICAL WORKFLOW USING COMPUTER BASED SIMULATIONS

Michelle R. Hribar, Sarah Read-Brown, Leah G. Reznick, Thomas R. Yackel, Michael F. Chiang

Purpose: Although electronic health records (EHRs) have potential to improve the quality and cost of health care, there are concerns that they negatively impact clinical efficiency. Ophthalmologists typically attempt to improve efficiency by scheduling, and by multiple ancillary staff members and exam rooms. However, there are no methods for optimizing this process. This study validates methods for automated time-motion data collection using EHR timestamps, and proposes using these data for computer simulation models to optimize efficiency.

Methods: Two authors (MRH, SRB) observed a provider (LGR) clinic for 3 days, using time-motion methods to manually record times that patients spent during each part of their exam (â??encounterâ??) with the provider and each ancillary staff member. Observed times were compared with timestamps automatically recorded in the EHR (Epic; Verona, WI). Simulation models (Arena; Rockwell Automation, Milwaukee, WI) were run using these data to optimize scheduling strategies, staff usage, and number of exam rooms for minimizing patient wait time.

Results: 33 patient visits were observed. This involved 28 (85%) encounters with ancillary staff and 27 (82%) encounters with the attending provider. Overall, 55/82 (67%) of encounter times from EHR timestamps fell within 3 minutes of observed times. Discrete simulation models showed impact on mean patient wait times: (1) improved when scheduling patients alternating dilated and not (8 minutes) vs. scheduling without regard to dilation (10.3 minutes); (2) improved when using 1 ancillary staff (12 mins/patient) compared to no ancillary staff (44 mins/patient), and reduced more (8 mins/patient) when using 2 ancillary staff; (3) improved when using 3 exam rooms (13 mins/patient) vs. 2 exam rooms (16 mins/patient), with less improvement (12 mins/patient) when using 4 exam rooms.

Conclusion: Automated EHR timestamp data can be used to estimate exam times accurately. This creates potential for creating computer simulation models to evaluate and improve efficiency and workflow.

COMPARISON OF DALK VS PK OUTCOMES FOR KERATOCONUS, STROMAL DYSTROPHIES AND HSV KERATITIS

Donald Tan, Marcus Ang, Anshu Arundhati

Purpose: To compare graft outcomes between Deep Anterior Lamellar Keratoplasty (DALK) and Penetrating Keratoplasty (PK) for various indications, including keratoconus, stromal dystrophies, and herpes simplex keratitis (HSV).

Methods: Data was obtained from the Singapore Cornea Transplant Study (SCTS), a prospective transplantation registry in Asian eyes spanning 4,700 grafts over 23 years. Chi-square and Fisher's Exact tests were conducted for comparison of disease groups, survival rates were determined using Kaplan-Meier method, and Mantel-Cox Log Rank test used to compare survival rates.

Results: Overall 1 and 5-year survival rates for 1,242 first time grafts performed between 2000 to 2011 was highest in DALK (96.3%, 90.5%) compared to PK (94.2%, 71%, p<.001), and EK (96%, 77.3%). Glaucoma was highest among PK (n=106, 17.8%) and EK (n=68, 19.4%), and lowest in the DALK group (n=22, 7.4%); graft rejection was also highest in the PK group (n=59, 9.9%), followed by EK (n=15, 4.2%) and DALK (n=3, 1.0%). In keratoconus (n=125), logMAR visual outcomes of descemets baring DALK and PK were not statistically different (0.15, 0.27 (p=.26) but were lower in the predescemet DALK cases (0.41, p=.013). Long term (10 year) survival analysis of 110 grafts (DALK=63, PK=47) for stromal dystrophies confirmed enhanced 10-year graft survival in the DALK group (log rank p=0.013) and similar rates of primary disease recurrence (PK=10.6%, DALK=12.7%, p=0.74). Analysis of 324 grafts for HSV keratitis (PK=224, DALK=100) showed better 6-year graft survival in the DALK group (PK=68.8%, D! ALK=85%)(log rank p=0.024) with lower incidence of HSV reactivation and reduced number of recurrences in DALK cases.

Conclusion: Our analysis of DALK outcomes as compared to PK for a variety of indications including keratoconus, stromal dystrophies and HSV keratitis confirms better long-term outcomes, in terms of reduced complications, and enhanced graft survival. Surgeons should consider performing DALK as an alternative to conventional PK for these conditions.

AFLIBERCEPT, BEVACIZUMAB, OR RANIBIZUMAB FOR DIABETIC MACULAR EDEMA

Lee M. Jampol

Purpose: To evaluate the relative visual acuity and OCT efficacy of intravitreous injections of vascular endothelial growth factor inhibitors aflibercept, bevacizumab, and ranibizumab for treating diabetic macular edema(DME)involving the center of the macula.

Methods: At 89 sites, one eye of 660 adults with decreased visual acuity from DME involving the macular center was assigned randomly to a standardized treatment protocol of aflibercept, bevacizumab, or ranibizumab. Follow up visits occurred every 4 weeks. The primary outcome was change in visual acuity at 1 year. Secondary outcomes included change in central subfield thickness on optical coherence tomography.

Results: The mean change in VA letter score at one year was greater with aflibercept (+13.3) than bevacizumab (+9.7) or ranibizumab (+11.2). The greater overall effect was driven by eyes with initial VA 20/50 or worse (50% of the cohort). Mean VA letter score improvement in this subgroup was +18.9 afilibercept, +11.8 bevacizumab, +14.2 ranibizumab (*P*-values : aflibercept-bevacizumab <0.001, aflibercept-ranibizumab =0.003, Ranibizumab-bevacizumab=0.21). The mean letter score difference between aflibercept and bevacizumab of +6.5 equates on a patient level to 63% relatively more aflibercept than bevacizumab-treated eyes improving ≥ 15 letters (improvement 67% versus 41%); +4.7 letter mean difference between aflibercept and ranibizumab equates to 36% relatively more aflibercept than ranibizumab-treated eyes (improvement 68% vs. 50%). For eyes with initial VA, 20/32 to 20/40 mean change in visual acuity was the same for all three drugs

Conclusion: In eyes with decreased VA from DME, all three agents on average substantially improve VA. However, the relative effect depends on initial visual acuity. When initial visual acuity loss is mild, on average, there were no apparent differences between the three treatment groups. However, the worse the initial VA, the greater the relative advantage of aflibercept over the two agents.

POSTER ABSTRACTS

THE ROLE OF LYMPHATIC VESSELS IN CORNEAL ALLOGRAFT REJECTION

Romulo Albuquerque, Woodford S Van Meter, Jayakrishna Ambati

Purpose: Successful corneal transplantation results in part from the avascularity of the cornea. Clinical studies and animal models of corneal allografts have linked both hemangiogenesis (blood vessels) and lymphangiogenesis (lymphatics) to increased rejection. The precise contribution of each of these two vasculature systems to allograft rejection is unclear. A variant of VEGF receptor-2, soluble VEGFR-2 (sVEGFR-2), has been described which specifically blocks lymphangiogenesis without affecting blood vessels. We evaluated the ability of sVEGFR-2 to block lymphatic vessels and the effect of inhibiting lymphangiogenesis on allograft rejection.

Methods: PCR was used to detect sVEGFR-2 mRNA and protein in the cornea of mouse, humans and other mammals. A tissue-specific genetic ablation system was used to delete sVEGFR-2 in the mouse cornea. The effects of this deletion were studied in murine models of suture injury and corneal transplantation. Rejected human allografts were studied for the presence of sVEGFR-2 and lymphatic vessels.

Results: Elimination of sVEGFR-2 genetic ablation resulted in spontaneous invasion of lymphatic vessels, but not blood vessels, into the mouse cornea at birth. Increased sVEGFR-2 by overexpression in mice reduced suture-induced corneal lymphangiogenesis by 70% with no effect on hemangiogenesis ($P<0.05$). sVEGFR-2 administration inhibited the invasion of lymphatic but not blood vessels into the donor bed and resulted in doubled allograft survival time ($P<0.05$). Rejected human corneal allografts that had ingrowth of lymphatic vessels lacked sVEGFR-2.

Conclusion: Endogenous sVEGFR-2 is a pure lymphangiogenesis inhibitor. sVEGFR-2 is required for the development of an alymphatic cornea and it is evolutionarily conserved in mammals. Uncoupling the two circulatory systems suggests that specific inhibition of lymphangiogenesis ALONE reduces allograft rejection. Corneas treated with sVEGFR-2 remained clear without inflammation despite the presence of blood vessels. sVEGFR-2 can be a therapeutic modality for reducing corneal allograft rejection and has potential use as a biomarker of early allograft rejection.

IS THERE A NEED FOR INTERVAL ULTRASOUND SCANNING TO DETECT INTRAOCULAR TUMORS IN EYES WITH OPAQUE MEDIA?

Sophie J. Bakri, Saranya Balasubramanian

Purpose: To study the prevalence of intraocular tumors detected by screening ultrasonography in eyes with opaque media.

Methods: Retrospective review of ultrasounds done in 119 eyes with opaque media and the diagnosis of blindness or phthisis between January 1, 1994 and December 31, 2013. Data were extracted on visual acuity, IOP, presence or absence of ocular pain, etiology of opaque media, number of ultrasounds received during study time period, and ultrasound findings. Follow up was defined as the time range for which an eye was followed from initial documentation of opaque media to last visit with opaque media. In addition, ultrasounds obtained for screening prior to evisceration or enucleation was noted along with pathology findings.

Results: A total of 173 ultrasounds corresponding to 119 eyes were reviewed. No intraocular tumors were detected. Mean age of patients was 59 years. Visual acuity was hand motions or worse in 89 eyes (74.8%), elevated IOP was found in 23 eyes (19.3%) and ocular pain was noted in 30 eyes (25.4%). 69 eyes with opaque media (58%) had at least one year follow up from initial visit where opaque media was noted. The mean follow up was 65 months (median 56 months; range 12-129). Of these, 2 eyes (2.9%) had an annual ultrasound, 43 eyes (62%), had an ultrasound done every 13-60 months, and 19 eyes (27.5%) had an ultrasound every 61-120 months. In addition, 16 eyes with opaque media for at least 6 years only received an ultrasound at presentation (11 eyes had 6-8 years follow up; 5 eyes had >8 years of follow up). 6 eyes had screening ultrasonography prior to evisceration or enucleation, with pathology clear of intraocular tumors.

Conclusion: In this series of eyes with opaque media, no intraocular tumors were detected by screening ultrasonography.

IMPAIRED LYSOSOMAL AND MITOCHONDRIAL FUNCTION IN EXFOLIATION GLAUCOMA

Audrey Bernstein, Andrew Want, Stephanie Gillespie, J. Mario Wolosin, Robert Ritch

Purpose: In the eye, exfoliation syndrome (XFS) is characterized by the aggregation of disorganized microfibrils (exfoliation material, XFM). Deposition of XFM and pigment in the aqueous outflow pathway leads to chronic intraocular pressure elevation leading in turn to glaucoma. Similar to other age-related diseases in which protein aggregates cause disease, we hypothesize that lysosomal and mitochondrial dysfunction lead to XFS pathology.

Methods: Tenon fibroblasts (TFs) were explanted from tissue discards obtained from older, age-matched XFS and primary open-angle glaucoma (POAG) patients who underwent trabeculectomy surgery and from young healthy donors who underwent strabismus surgery. Cell size and mitochondrial membrane potential (JC1 dye) were quantified by flow cytometry. Lysosomes and microtubules

were immunodetected with Lamp-1 and β-tubulin antibody, respectively. Culturing TFs in media with stabilized vitamin C for 1 month generated self-synthesizing 3D gels.

Results: Normally, under conditions of nutrient deprivation, lysosomes become peri-nuclear, where they fuse with autophagosomes, clearing the cells of waste. In XFS TFs compared to POAG TFs and healthy TFs, lysosomes did not relocalize in response to changes in nutrient conditions, suggesting that lysosomal degradation is impaired in these cells. In 3D culture, XFS TFs demonstrated a disorganized morphology with elevated protein expression of XFM-containing proteins LOXL1 and Fibulin-5. Consistent with impaired lysosomal degradation a) the percent of cells displaying depolarized mitochondria was 10x higher in XFS than in POAG TFs (26 % vs. 2%, $p < 0.01$) and b) the build up of intracellular organelles led to a 1.7-fold increase in XFS cell size.

Conclusion: Our findings suggest that lysosomes and mitochondria are compromised in XFS TFs, leading to a toxic environment. This may lead to reduced degradation and increased secretion of XFM aggregates. This represents the first intracellular pathologic findings reported in XFS.

MATHEMATICAL ANALYSIS OF ALEXIDINE ABSORPTION BY HIGH DENSITY POLYETHYLENE PLASTIC BOTTLES AND THE WORLDWIDE RENU-RELATED FUSRIUM KERATITIS EVENT OF 2004-2006

John D. Bullock, Harry J. Khamis, Ronald E. Warwar

Purpose: In May 2006, Bausch & Lomb was cited by the Food and Drug Administration for improper storage/transport temperatures of ReNu with MoistureLoc (RML) multi-purpose contact lens solution [1]. The Centers for Disease Control and Prevention suggested disinfection failure as the cause of this event [2]. RML contained the antimicrobial agent, alexidine (0.00045% = 4.5 parts per million [PPM]). In our previous studies: heating (56oC) RML in its bottle resulted in its decreased ability to inhibit Fusarium organisms [3]; and, Fourier transform infrared (FTIR) spectroscopy showed that alexidine absorbed into the wall of the RML polyethylene bottle [4]. The purposes of the present study were to measure alexidine concentrations over time and mathematically correlate them with our previous FTIR spectroscopic and microbiological studies.

Methods: Triplicate alexidine levels (initially, 4.5 PPM) were measured by liquid chromatography/mass spectroscopy in heated (56oC)/unheated RML bottles stored for six hours to four weeks. Using a Gauss-Newton iterative least squares nonlinear regression estimation procedure (Statistical Analysis System [SAS]), alexidine loss, L, was fit to an exponential saturation curve, $L = S(1-[e-kt])$, where S is the alexidine saturation level, k is a function of storage temperature, and t is time.

Results: The ratio of heated:unheated alexidine loss, calculated by integrating the exponential functions, was 3.0, equivalent to that previously determined by FTIR spectroscopy (3.1). Over 95% of the alexidine was lost from the heated solution at one week. When the alexidine concentration decreases to < 0.8 PPM, the solution fails to inhibit Fusarium organisms.

Conclusion: These studies signify that temperature-enhanced alexidine-polyethylene interaction was the pharmaceutical failure mechanism of the Fusarium keratitis event of 2004-2006.

EVALUATION OF OPTIC NERVE GLIOMA SERIES AT THE ARMED FORCES INSTITUTE OF PATHOLOGY SUGGESTS POSSIBLE INTERVENTIONS IN CELLULAR SENESCENCE AND MICROGLIAL PATHWAYS

J. Douglas Cameron, Fausto Rodrigues, Elisebeth Rushing, Iren Horkayne-Szakaly, Charles Eberhart

Purpose: To describe the demographic and clinical characteristics of an optic nerve glioma case series; to describe the historical context of tissue evaluation techniques from museum to molecular at the AFIP; and identify molecular factors in senescence and microglial pathways with treatment potential.

Methods: Cases were retrieved from the Armed Forces Institute of Pathology Registry of Ophthalmic Pathology. Clinical information was tabulated. In specimens with sufficient tissue, a tissue microarray (TMA) was constructed to conduct molecular studies.

Results: Ninety-two cases were included: gender distribution was M:F::1.6 (2 months to 50 years) (average 10.8 years). NF1 was identified in 10 (10.8%) cases. The majority presented with decreased vision and exophthalmos. Forty-eight cases were studied by a tissue microarray construction. Glial fibrillary acidic protein (GFAP), a control for immunoreactivity, was positive in 46 (96%) cases. Immunoreactivity for p16 protein was seen in 36 (75%) cases and CD68 positive cells in 34 (71%). Limitations include referral bias, limited clinical information, limited amount of tissue, and extended period of tissue preservation.

Conclusion: ONG is a tumor of the visual axis in young individuals, which is generally indolent but with a variable clinical course. Traditional histopathologic techniques have not been reliably predictive of clinical course. This microarray provides representative

demographic, clinical and histologic characteristics for ONG. Immunoreactivity to P16 protein and CD68 are positive in the majority. These findings suggest a possible explanation for the variable clinical course and identify therapeutic targets in the cell senescence and microglial pathways.

OCT AND VISUAL RESULTS AT SIX MONTHS AFTER TRANSITIONING TO AFLIBERCEPT FOR PATIENTS ON PRIOR RANIBIZUMAB OR BEVACIZUMAB TREATMENT FOR EXUDATIVE AMD (AN AOS THESIS)

Clement Chan, Atul Jain, Srinivas Sadda, Neeta Varshney

Purpose: To study the OCT and vision outcomes and complications at 6 months (mo) after transitioning from intravitreal ranibizumab or bevacizumab, or both to aflibercept for eyes with exudative age-related macular degeneration

Methods: This retrospective study adhered to strict inclusion and exclusion criteria, and all conditions that could confound results were excluded. Single masked investigator performed all OCT measurements by Simplified Method per Heussen et al.[1] All adverse events were recorded

Outcome measures included the following: Macular Volume; central-1 and 3-mm subfields; subretinal fluid (SRF), cystoid macular edema (CME) and pigment epithelial detachment (PED) heights (Ht) and volumetrics (Vol); best spectacle and pinhole VA for each visit.

Results: From 11/11 to 2/13, 189 eyes (E) in 172 patients (mean age:83.4; 66 men) receiving ranibizumab (84E), bevacizumab (95E), or Mixed Group (both drugs) (10E) were transitioned (Tx) to aflibercept and followed for 6 mo. Overall mean pre-Tx and post-Tx injection frequencies in 6 mo were 6.5 and 5.4, respectively. Baseline characteristics were comparable among all groups. For entire cohort, significant decreases were noted for post-Tx vs pre-Tx SRF/CME/PED Ht and Vol (all $p<.001$). Post-Tx vs pre-Tx VA were (20/48 vs 20/58, $p<.001$). Sub-group analysis showed no differences between bevacizumab and ranibizumab in improved post-Tx SRF/CME/PED Ht and Vol (all $p\leq.001$). Post-Tx VA, SRF/CME/PED Ht and Vol were improved for Nonresponders (suboptimal response to bevacizumab or ranibizumab), ($p\leq.001$), but not for Responders (good response to same) at 6 mo. Only adverse event was RPE tear in 1E.

Conclusion: Study eyes showed significant improvements in all OCT measures and vision at 6 mo after transitioning from bevacizumab or ranibizumab to aflibercept. VA and OCT metrics were improved for Nonresponders and maintained for Responders. Post-Tx adverse events were uncommon.

CHALAZIA ASSOCIATED WITH INTRAVENOUS BORTEZOMIB FOR TREATMENT OF MULTIPLE MYELOMA

Frederick W Fraunfelder, Matthew Benage, Kell Yang

Purpose: To report an association between chalazia and intravenous bortezomib treatment for multiple myeloma

Methods: Spontaneous reports from World Health Organization (WHO) (Uppsala Monitoring Centre, Uppsala, Sweden) as well as Medline literature search using the keywords â€œbortezomibâ€□, â€œchalaziaâ€□and â€œmultiple myelomaâ€□.

Results: At total of 24 cases are reported from the WHO Monitoring Centre and two case series. 14 cases of chalazia were reported to the WHO monitoring Centre, with 5 female cases, 8 male cases, and 1 of unknown gender. 5 cases reported positive re-challenge and 2 cases reported positive de-challenge. Grob et al, reported 6 cases of chalazia following bortezomib (4 females and 2 males) with an average onset of 3.3 months. 5 cases reported positive de-challenge. Furthermore, Mundia, et al, reported 4 cases of chalazia with an 11-22 month time course.

Conclusion: Because of the large number of cases amassed among all three groups and the striking finding that the WHO study and the Mass Eye and Ear study both produced a large number of positive de-challenge cases, we conclude that there is a likely association between chalazia and intravenous bortezomib for treatment of multiple myeloma.

HEMORRHAGIC RISK OF VITREORETINAL SURGERY IN PATIENTS MAINTAINED ON NOVEL ORAL ANTICOAGULANT THERAPY (NOACS)

M. Gilbert Grand, MD, Harpreet S. Walia

Purpose: To evaluate the frequency and type of perioperative hemorrhagic complications associated with vitreoretinal surgery in patients undergoing systemic treatment with the newer anticoagulant and antiplatelet agents (NOACS) including rivaroxaban, apixaban, dabigatran and prasurgel.

Methods: Retrospective review of a cohort of patients being treated with anticoagulant and antiplatelet drugs who underwent any vitreoretinal surgical procedure over a two year period.

Results: Thirty-six eyes of 33 patients on these medications underwent vitreoretinal surgical operations. No eyes suffered perioperative complications of retrobulbar hemorrhage, suprachoroidal hemorrhage, subretinal hemorrhage or intraoperative bleeding. Four eyes (11.1%) experienced postoperative vitreous cavity hemorrhage; two of these eyes (5.5%) required repeat surgical intervention and two eyes (5.5%)cleared the hemorrhage spontaneously.

Conclusion: This is the first report describing the frequency and type of hemorrhagic complications occuring in patients undergoing vitreoretinal surgery while on therapy with NOACS drugs. None of our patients experienced intraoperative hemorrhagic complciations. The postoperative vitreous hemorrhage rate was consistent with rates reported in patients undergoing similar surgery while anticoagulated with warfarin. Our findings suggest that patients may safely undergo vitreoretinal surgery while maintaining therapy with rivaroxaban, apixaban,dabigatran and prasurgel (NOACS). Decisions to modify anticoagulation may have serious implications and should be made on an individualized basis. Patients need to be informed of hemorrhagic risks associated with vitreoretinal surgery.

OCULAR PERFUSION PRESSURE VERSUS ESTIMATED TRANS-LAMINA CRIBROSA PRESSURE DIFFERENCE IN GLAUCOMA. THE CENTRAL INDIA EYE AND MEDICAL STUDY

Jost B. Jonas, Ningli Wang, Vinay Nangia

Purpose: To test the hypothesis whether taking trans-lamina pressure difference into the consideration changes associations between ocular perfusion pressure and glaucomatous optic neuropathy.

Methods: The population-based Central India Eye and Medical Study included 4711 subjects. Ocular perfusion pressure was calculated as 2/3x (diastolic blood pressure+1/3(systolic blood pressureâ€“diastolic blood pressure)â€“Intraocular pressure (IOP). Cerebrospinal fluid pressure [mmHg] was estimated as 0.44 Body Mass Index[kg/m2]+0.16 Diastolic Blood Pressure[mmHg]-0.18xAge[Years]-1.91. Trans-lamina pressure difference was IOPâ€“cerebrospinal fluid pressure.

Results: In multivariate analysis, higher open-angle glaucoma prevalence was associated with higher IOP (P<.001;odds ratio (OR):1.19; 95% confidence interval (CI):1.15,1.24) or with higher trans-lamina pressure difference (P<.001;OR:1.15;95%CI:1.10,1.19), but not with ocular perfusion pressure (P<.37). A smaller neuroretinal rim area was correlated with higher IOP (P<.001;standardized coefficient beta:-0.09) or larger trans-lamina pressure difference (P<.001;beta:-0.10), but not with ocular perfusion pressure (P=.26). Greater prevalence of angle-closure glaucoma was associated with higher IOP (P<.001;OR:1.22;95%CI:1.15,1.28) or higher trans-lamina pressure difference (P<.001; OR:1.19;95%CI:1.13,1.25) or lower ocular perfusion pressure (P<.04; OR:0.95;95%CI:0.90,0.996). Correlation coefficients were highest for the association with IOP and lowest for ocular perfusion pressure. A smaller rim area was correlated with higher IOP (P<.001;beta:-0.08) and higher trans-lamina pressure difference (P<.001;beta:-0.08); rim area and ocular perfusion pressure were not significantly associated (P=.25).

Conclusion:The present study provides information of the relationship of trans-lamina pressure difference to the development of optic nerve damage in what is presently called glaucoma. It does not provide support of the idea that ocular perfusion pressure plays a major role in the pathogenesis of optic neuropathy.

ROLE OF INTRARETINAL NITRIC OXIDE IN THE DEVELOPMENT OF DIABETIC RETINOPATHY

Jennifer J Kang-Mieler, William F Mieler

Purpose: The goal of this study was to directly measure in vivo retinal nitric oxide (NO) concentration in experimental early diabetic retinopathy and to determine how intraretinal NO changes with severity of diabetes.

Methods: Long-Evans rats were made diabetic with streptozotocin (STZ). Three weeks post-STZ injection, intraretinal NO concentration profiles were recorded using a dual NO/electroretinogram microelectrode. Diabetic profiles were compared to profiles from healthy controls, healthy rats injected with the NO synthase inhibitor L-NG-nitroarginine methyl ester (L-NAME), and healthy rats that received acute glucose injections (acute hyperglycemia). NO values at the retina/RPE boundary (100% retinal depth) and retinal surface (0% depth) were analyzed for correlation with blood glucose.

Results: The average NO concentrations in the outer retina, inner retina, and vitreous humor of mild diabetics (250-400 mg/dL) were significantly higher than control by 73%, 47%, and 70%, respectively. The average NO concentrations in the outer retina, inner retina, and vitreous humor of severe diabetics (500-600 mg/dL) were lower than control with NO at 41%, 36%, and 36% of control, respectively. Severe diabetic NO profiles were also similar to L-NAME treated eyes. NO levels in moderate diabetics (400-500 mg/dL) and acute hyperglycemia rats were similar to control. NO was significantly and inversely correlated with blood glucose for diabetic rats at 100% depth (R=-0.91) and 0% depth (R=-0.79) but not for acute hyperglycemia rats.

Conclusion: The higher-than-control level of NO in mild diabetics and lower-than-control level in severe diabetics show that severity of diabetes may be an important factor in the development of early stages of diabetic retinopathy.

STEROID DIFFERENTIATION: THE SAFETY PROFILE OF VARIOUS STEROIDS ON RETINAL CELLS IN VITRO AND THEIR IMPLICATIONS FOR CLINICAL USE

Baruch D. Kuppermann, Leandro Zacharias, Cristina M. Kenney

Purpose: To determine if potentially viable alternatives to the clinical use of intravitreal triamcinolone acetonide should be considered based on a comparative assessment of the in vitro effects of five commercially available corticosteroids. We hypothesized that dexamethasone, betamethasone, methylprednisolone, loteprednol etabonate, and fluocinolone acetonide, at clinically relevant doses, may show different levels of in vitro cytotoxicity to retinal cells.

Methods: Cultures of human retinal pigment epithelial cells (ARPE-19) and rat embryonal neurosensory precursor retinal cells (R28) were treated with dexamethasone, betamethasone, methylprednisolone, loteprednol, or fluocinolone acetonide. Cell viability as a measure of cell death was determined by trypan blue dye exclusion assay. The mechanical effect of drug crystals was evaluated by solubilizing the steroid formulations. Mitochondrial dehydrogenase and membrane potential were assessed to measure cell damage.

Results: Betamethasone, loteprednol, and methylprednisolone, in commercially available forms, caused significant cytotoxic changes to retinal cells in vitro at clinically relevant doses. This effect was less pronounced with solubilized betamethasone. Dexamethasone at concentrations up to 5 times the clinical dose of free drug injections and 1000 times greater than a drug implant did not cause decreased cell viability. Fluocinolone acetonide at doses 1000 times higher than observed with drug delivery systems showed no cytotoxic effect.

Conclusion: Betamethasone, loteprednol, and methylprednisolone exhibited cytotoxicity at clinically relevant doses and do not appear to be good therapeutic options for intravitreal use. In comparison, dexamethasone and fluocinolone acetonide, which exhibited fewer cytotoxic effects than other steroids, may be potentially viable alternatives to triamcinolone acetonide for clinical use.

ENDOGENOUS ENDOPHTHALMITIS − ONE EYE FOLLOWED BY THE OTHER

Sid Schechet, Jason Hong, Vinod Lakhanpal

Purpose: To describe an unusual case of culture-proven bilateral endogenous endophthalmitis secondary to an underlying psoas abscess. The patient first was found to have endophthalmitis in the left eye, and, in spite of being on the appropriate intravenous antibiotics, he subsequently developed endophthalmitis in the right eye.

Methods: A 54 year-old male with no ocular history presented to the emergency room with lower abdominal pain. He was found to have an ST-elevation myocardial infarction. After undergoing coronary stenting, he developed Methicillin- sensitive staph aureus (MSSA) sepsis. While on appropriate intravenous antibiotics he developed endophthalmitis in the left eye (VA count fingers) followed two days later by endophthalmitis in the right eye (VA 20/200).

Results: Within 24 hours of reported visual symptoms, and presumed left endophthalmitis, he underwent vitreous tap and vitrectomy with intravitreal Vancomycin and Amikacin. Vitreous cultures grew MSSA. Two days later he developed MSSA culture-positive endophthalmitis in the right eye despite being on IV antibiotics, and he was treated with intravitreal antibiotics. CT scan of the abdomen revealed a psoas abscess which was drained and also found to be MSSA. Three weeks later his VA improved to 20/40 OD and 20/25 OS.

Conclusion: This case demonstrates that despite being on the appropriate intravenous antibiotics, patients can still develop endophthalmitis due to poor ocular penetration of the antibiotics. Early recognition of this disease with aggressive management of vitreous tap and antibiotic injection with or without vitrectomy should be considered to ensure a successful visual outcome. Close follow up and communication with the primary team is vital in terms of locating and treating the underlying pathology.

AN ANALYTICAL REPORT OF PUBLICATION PRODUCTIVITY FOR 748 ACADEMIC OPHTHALMOLOGISTS AND 37 DEPARTMENTS IN THE SOUTHERN REGION OF THE UNITED STATES.

Craig R Thiessen, Garrett T Venable, Nick C Ridenhour, Natalie C Kerr

Purpose: Bibliometrics, a statistical method to analyze scientific literature, has yet to be applied to academic ophthalmology departments. While many benchmarking methods have been proposed, the h-index has been most widely accepted. The h-index samples a researcherâ€™s publication quantity while controlling for a measure of quality. The m-quotient adjusts the h-index according to the number of years elapsed in the field. We measured the publication productivity of academic ophthalmology departments in the Southern region of the United States.

Methods: Bibliometric profiles were created for 748 ophthalmologists from 37 (of 39) nonmilitary departments in the Southern United States. Profiles included the h-index and m-quotient, which were calculated from the citation database, Scopus. Comparisons

between academic rank (i.e. chairman, professor, associate, assistant, and instructor), subspecialty, and gender were also performed. Departments were ranked by the summation of h-indices for each member in a department and also by mean h-index for the whole department.

Results: The median h-index and m-quotient were 10.16 and 0.53 respectively. Both of these values exhibit a positive relationship with increasing academic rank ($p < 0.001$). Ophthalmologists with subspecialties in pathology, neurology, vitreoretina, cornea and external disease, and glaucoma had higher median h-indices than those in uveitis, pediatrics, oculoplastics, comprehensive, and oncology. Males demonstrated a significantly higher mean h-index (11.55, n=523) than females (mean = 6.91, n=225) after correction for academic rank ($p = 0.001$). However, there was no significant difference in m-quotients between genders. Ranked by summed h-indices, the top 5 programs for publication productivity in the Southern region of the U.S. in descending order were University of Miami, Johns Hopkins University, Duke University, Baylor College of Medicine, and Emory University.

Conclusion: This report presents the first detailed publication analysis utilizing bibliometrics to assess academic ophthalmology. These results provide academic benchmarks that may be used for further analysis and program development.

STEM CELL LINES FROM PATIENTS WITH THE MACULAR DEGENERATION COMPLEX

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Purpose: Genome-wide association studies (GWAS) identified DNA variants that are strong risk factors for age-related macular degeneration (AMD). One single-nucleotide polymorphism (SNP) lies in the 402H allele in the CFH gene and the three others are tightly linked and lie in the neighboring HTRA1 and ARMS2 genes. These SNPs confer the most significant genetic risk factors in the history of GWAS studies in human genetics. How these mutations might cause sight to deteriorate is unclear because the underlying molecular mechanisms of AMD are unknown.

Methods: Induced pluripotent stem (iPS) cell-derived RPE from patients provides us with earlier stage AMD patient-specific cells and allows us to analyze the underlying mechanisms at this critical time point.

Results: An unbiased proteome screen of A2E-aged patient-specific iPS-derived RPE cell lines identified SOD2-mediated antioxidative defense in the genetic allele's susceptibility of AMD. The AMD-associated risk haplotype (T-in/del-A) impairs the ability of the RPE to defend against aging-related oxidative stress. SOD2 defense is impaired in RPE homozygous for the risk haplotype (T-in/del-A; T-in/del-A), while the effect was less pronounced in RPE homozygous for the protective haplotype (G-Wt-G; G-Wt-G). ARMS2/HTRA1 risk alleles decrease SOD2 defense, making RPE more susceptible to oxidative damage and thereby contributing to AMD pathogenesis.

Conclusion: iPS cells can be differentiated and "aged" to generate a virtually unlimited supply of RPE that models early-stage AMD (or an aged control) which risk allele drives risk for AMD can be determined by monitoring SOD2 activities as a surrogate for increased risk.

COMPARATIVE RESULTS WITH REGARDS TO HUMPHREY VISUAL FIELDS AND THE SPARCS CONTRAST SENSITIVITY TEST IN PATIENTS WITH GLAUCOMA

Michael Waisbourd, Priyanka Gogte, Jesse Richman, Eric Spaeth, Yang Dai, Sheryl Wizov, Lisa Hark, George Spaeth

Purpose: To compare visual field clusters obtained by the Humphrey visual field (HVF, 24-2 SITA Standard perimeter, Carl Zeiss Meditec, Inc., Dublin, CA) analyzer with contrast sensitivity clusters obtained by the Spaeth-Richman Contrast Sensitivity (SPARCS) test. SPARCS is a novel computerized-base test, which measures contrast sensitivity threshold of patientsâ€™ central vision and peripheral vision.1

Methods: Central, superior and inferior HVF clusters were compared with contrast sensitivity clusters obtained by SPARCS in the same regions. For each HVF and SPARCS cluster, the mean deviation (MD) or contrast sensitivity scores were averaged. Pearson correlation coefficient was calculated for each cluster.

Results: One hundred and sixty-one patients with moderate-stage glaucoma were included in the study. The mean age was 64.6 years (rang: 30-83), predominantly female (n=86, 53%). The mean MD score significantly correlated with the mean SPARCS score (HVF MD=-9.79 dB, SPARCS=11.30; $r=0.62$, $P<0.0001$). The superior and inferior clusters showed stronger correlations compared with the central cluster (inferior cluster: $r=0.72$, $P<0.0001$; superior cluster: $r=0.67$, $P<0.0001$; central cluster: $r=0.46$, $P<0.0001$).

Conclusion: Visual field MD scores significantly correlated with SPARCS scores in all tested clusters. The strongest correlations were in the superior and inferior clusters. This investigation supports our previous study, 1 showing that contrast sensitivity measured by SPARCS is a potentially useful tool in the overall assessment of patients with glaucoma.

INCIDENCE AND RISK FACTORS FOR DEVELOPING DIABETIC RETINOPATHY AMONG YOUTH WITH TYPE 1 AND TYPE 2 DIABETES THROUGHOUT THE UNITED STATES

Sophia Y. Wang, Chris A. Andrews, William Herman, Thomas W. Gardner, Joshua D. Stein

Purpose: Despite the rise of Type 2 diabetes mellitus (T2DM) among children and adolescents in the United States, little is known about the incidence of diabetic retinopathy (DR) among children with T2DM compared to those with Type 1 DM (T1DM) and risk factors associated with DR in youth with T2DM.

Methods: We reviewed data from a large U.S. managed care network to identify all children and adolescents age ≤21 years who were newly diagnosed with T1DM or T2DM and underwent ≥1 examination by an ophthalmologist or optometrist. Youth who developed DR were identified by ICD-9-CM diagnosis codes. Kaplan-Meier survival curves were created to depict the time from first DM diagnosis to first record of DR. Multivariable Cox regression modelling was performed to identify sociodemographic factors associated with DR development.

Results: Among the 2457 eligible youth with newly-diagnosed T1DM and 1673 with T2DM, 275 (6.7%) developed DR. The proportion of youth with T1DM and T2DM who developed DR was 9.2%, and 2.9%, respectively. The incidence rates of DR were 25.8 and 8.9 per 1000 person-years among youth with T1DM and T2DM, respectively. Youth with T1DM developed DR faster than youth with T2DM ($P<0.0001$, Log-Rank test). Youth with T1DM had a 322% increased hazard rate of developing DR compared to those with T2DM (HR 4.22, CI 2.98-5.99). Males had a 29% increased hazard rate of developing DR compared to females (HR 1.29, CI 1.00-1.65). For each one year age increase at time of first DM diagnosis, the hazard rate for developing DR increased by 7.7% (HR 1.08, CI 1.05-1.10).

Conclusion: Youth with T1DM and T2DM exhibit significant risk of retinopathy and should undergo regular screenings by eye care professionals to check for DR. These results will help formulate clinical practice guidelines to advise clinicians when to screen children with T2DM for DR.

CARRIER FREQUENCY OF CYP1B1 MUTATIONS IN THE UNITED STATES

Janey L. Wiggs, Keri F. Allen

Purpose: CYP1B1 mutations cause autosomal recessive congenital glaucoma. Disease risk assessment for families with CYP1B1 mutations requires knowledge of the population mutation carrier frequency. The purpose of this study is to determine the CYP1B1 mutation carrier frequency in clinically normal individuals residing in the United States. Because CYP1B1 mutations can exhibit variable expressivity, we hypothesize that the mutation carrier frequency is higher than expected.

Methods: Two hundred fifty individuals without glaucoma or a family history of glaucoma were enrolled. CYP1B1 mutations were identified by DNA sequencing, and pathogenicity was estimated by PolyPhen-2 or a previous report of disease causality.

Results: Based on the disease frequency (1 in 10,000) and prevalence of CYP1B1-related congenital glaucoma (15% to 20%), the frequency of CYP1B1-related congenital glaucoma in the United States is approximately 1 in 50,000. Assuming Hardy-Weinberg equilibrium, the expected CYP1B1 mutation carrier frequency would be 1 in 112, or 0.89%. Among the 250 study participants, 11 (4.4%) are carriers of a single pathogenic mutation, representing a carrier frequency of 1 in 22, which is 5.1 times the expected frequency. A higher-than-expected carrier frequency (1 in 33, 3.0%) was also observed in 4300 white individuals sequenced by the National Heart Lung and Blood Institute Exome Sequencing Project.

Conclusion: Our results show that the CYP1B1 mutation carrier frequency in the US population is between 1 in 22 and 1 in 33, which is 5.1 to 3.4 times the expected frequency. These results suggest that more individuals than expected are carriers of a deleterious CYP1B1 mutation, and that the prevalence of CYP1B1-related disease may be higher than expected.

CAN BENZALKONIUM CHLORIDE BE DETECTED IN THE AQUEOUS OF GLAUCOMA PATIENTS

Jacob T. Wilensky

Purpose: Benzalkonium chloride (BAK) is used as a preservative in many glaucoma medications. In vitro studies have shown that BAK is toxic to trabecular meshwork cells. Theoretically such toxicity could lead to worsening of the glaucoma, in which case these medications should be avoided. We are unaware of any studies indicating whether BAK can be found in aqueous humor. This study was performed to determine whether BAK could be detected in the aqueous of glaucoma patients after administration of BAK containing medications.

Methods: Aqueous samples were obtained from 10 glaucoma patients who were undergoing a glaucoma drainage operation. All had been treated chronically with BAK containing medications. Additionally, a drop of a BAK containing antibiotic was instilled in the surgical eye one hour prior to surgery. After the eye was anesthetized a paracentesis was performed with a 30 guage needle and .1 cc

of aqueous was aspirated. The aqueous samples were tested with mass spectrometry to determine the presence of BAK. We determined the sensitivity of the test using serial dilutions of BAK containing eye drops.

Results: We were able to detect BAK down to a concentration of 0.1 micrograms per milliliter. The test could also detect BAK when a BAK containing eye drop was mixed with an aqueous sample. We were unable to detect Bak in any of the 10 aqueous sample obtained from the glaucoma patients.

Conclusion: Our results indicate that BAK is not present in the aqueous of glaucoma patients chronically using BAK containing medications, and, therefore, is unlikely to cause additional damage to the trabecular meshwork and worsen the glaucoma.