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TABLE OF CONTENTS
THE AMERICAN OPHTHALMOLOGICAL SOCIETY 2015

OFFICERS AND COUNCIL vi
PRESIDENTS OF THE SOCIETY vii
RECIPIENTS OF THE LUCIEN HOWE MEDAL x
FREDERICK H. VERHOEFF LECTURERS xii
BLODI LECTURERS xiii
MEMBERS xiv
EDITORIAL BOARD xvi

NECROLOGY

IN MEMORIUM Necrology 1

MINUTES OF THE PROCEEDINGS

INTRODUCTION Proceedings 1
PAPERS: FRIDAY, MAY 15 1
EXECUTIVE SESSION 1
- REPORT OF THE EXECUTIVE VICE-PRESIDENT 2
- REPORT OF THE CHAIR OF THE COUNCIL 2
- REPORT OF THE AUDIT COMMITTEE 2
- REPORT OF THE COMMITTEE ON THESES 3
- REPORT OF THE EDITOR 3
- REPORT OF THE COMMITTEE ON PROGRAMS 4
- REPORT OF THE COMMITTEE ON MEMBERSHIP 5
- REPORT OF THE ARCHIVIST / PHOTOGRAPHER 6
- REPORT OF THE REPRESENTATIVE TO THE COUNCIL OF THE AMERICAN ACADEMY OF OPHTHALMOLOGY 8
- REPORT OF THE REPRESENTATIVE TO THE AMERICAN COLLEGE OF SURGEONS 9
- REPORT OF THE REPRESENTATIVES TO THE AMERICAN ORTHOPTIC COUNCIL 11

PAPERS: SATURDAY, MAY 16 13
BANQUET 13
REPORT OF THE COMMITTEE ON ATHLETICS 15
PAPERS: SUNDAY, MAY 17 16
MEMBERS IN ATTENDANCE 17

PAPER ABSTRACTS Abstracts 1

TNFALPHA INDUCED CHOROIDAL NEOVASCULARIZATION INHIBITED BY ACTIVE RAP1 GTPASE.
HAIBO WANG, MARY ELIZABETH HARTNETT

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

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

NAILFOLD MICROVASCULAR ABNORMALITIES IN PRIMARY OPEN-ANGLE GLAUCOMA.
LOUIS R. PASQUALE *, AIAI REN, AKIKO HANYUDA, JAE HEE KANG, MICHAEL GIOVINGO, PAUL KNEPPER
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

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

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

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

THE CECOCENTRAL SCOTOMA: A NEURO-OPHTHALMIC UPDATE.
STEVEN A. NEWMAN

USE OF THE AMERICAN BOARD OF OPHTHALMOLOGYS MAINTENANCE OF CERTIFICATION PROGRAM TO MEET REGULATORY AND QUALITY REQUIREMENTS.
DAVID WILSON, MICHAEL SIATKOWSKI, JOHN CLARKSON

DEFECTIVE EPITHELIAL BASEMENT MEMBRANE REGENERATION, MYOFIBROBLASTS, AND SCARRING IN THE CORNEA AFTER PRK IN RABBITS.
STEVEN E. WILSON

THE POWER OF SAMPLE SIZE IN UNDERSTANDING FLAP STRIAE AS A RISK FACTOR OF LOW INCIDENCE IN REFRACTIVE SURGERY.
RONALD R. KRUEGER, MINORU TOMITA

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

PARTIAL MUSCLE RECESSION FOR SMALL-ANGLE VERTICAL STRABISMUS.
STEVEN M. ARCHER, CATHERINE S. CHOI, JASLEEN K. SINGH

TRANSFORMATION OF BENIGN CHOROIDAL NEVI TO MALIGNANT MELANOMAS: AUTHORITATIVE PRONOUNCEMENTS VERSUS SCIENTIFIC EVIDENCE.
JAMES J. AUGSBURGER , ZELIA M. CORREA

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

COMPARISON OF DALK VS PK OUTCOMES FOR KERATOCONUS, STROMAL DYSTROPHIES AND HSV KERATITIS.
DONALD TAN, MARCUS ANG, ANSHU ARUNDHATI

AFLIBERCEPT, BEVACIZUMAB, OR RANIBIZUMAB FOR DIABETIC MACULAR EDEMA.
LEE M. JAMPOL

POSTER ABSTRACTS Abstracts 9

THE ROLE OF LYMPHATIC VESSELS IN CORNEAL ALLOGRAFT REJECTION
ROMULO ALBUQUERQUE, WOODFORD S VAN METER, JAYAKRISHNA AMBATI

IS THERE A NEED FOR INTERVAL ULTRASOUND SCANNING TO DETECT INTRAOCULAR TUMORS IN EYES WITH OPAQUE MEDIA
SOPHIE J. BAKRI, SARANYA BALASUBRAMANIAN

IMPAIRED LYSOSOMAL AND MITOCHONDRIAL FUNCTION IN EXFOLIATION GLAUCOMA
AUDREY BERNSTEIN, ANDREW WANT, STEPHANIE GILLESPIE, J. MARIO WOLOSIN, ROBERT RITCH

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

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

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

Chalazia Associated With Intravenous Bortezomib For Treatment Of Multiple Myeloma
Frederick W Fraunfelder, Matthew Benage, Kell Yang

Hemorrhagic Risk Of Vitreoretinal Surgery In Patients Maintained On Novel Oral Anticoagulant Therapy (Noacs)
M. Gilbert Grand, Md, Harpreet S. Walia

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

Role Of Intraretinal Nitric Oxide In The Development Of Diabetic Retinopathy
Jennifer J Kang-Mieler, William F Mieler

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

Endogenous Endophthalmitis - One Eye Followed By The Other
Sid Schechet, Jason Hong, Vinod Lakhanpal

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

Stem Cell Lines From Patients With The Macular Degeneration Complex
Jin Yang, Yao Li, Lawrence Chan, Yi-Ting Tsai, Wen-Hsuan Wu, Huy V. Nguyen, Chun-Wei Hsu, Lewis M. Brown, Janet R. Sparrow, Stephen H. Tsang

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

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

Carrier Frequency Of Cyp1B1 Mutations In The United States
Janey L. Wiggs, Keri F. Allen

Can Benzalkonium Chloride Be Detected In The Aqueous Of Glaucoma Patients
Jacob T. Wilensky

THESES

A Two-Piece Microkeratome-Assisted Mushroom Keratoplasty Improves The Outcomes And Survival Of Grafts Performed In Eyes With Diseased Stroma And Healthy Endothelium
Massimo Busin MD, Silvana Madi MD, Vincenzo Scorcia MD, Paolo Santorum MD, and Yoav Nahum MD

THE GLOBAL EDUCATION NETWORK FOR RETINOPATHY OF PREMATURITY (GEN-ROP): DEVELOPMENT, IMPLEMENTATION, AND EVALUATION OF A NOVEL TELE-EDUCATION SYSTEM
R.V. PAUL CHAN MD, SAMIR N. PATEL BS, MICHAEL C. RYAN MS, KARYN E. JONAS BSN, SUSAN OSTMO MS, ALEXANDER D. PORT MD, GRACE I. SUN MD, ANDREAS K. LAUER MD, AND MICHAEL F. CHIANG, MD

DONOR CORNEAL TRANSPLANTATION VS BOSTON TYPE 1 KERATOPROSTHESIS IN PATIENTS WITH PREVIOUS GRAFT FAILURES: A RETROSPECTIVE SINGLE CENTER STUDY
ESEN K. AKPEK MD, SANDRA D. CASSARD SCD, KAREN DUNLAP OD, SARAH HAHN MD, AND PRADEEP Y. RAMULU MD PHD

CAN VISUAL FIELD PROGRESSION BE PREDICTED BY CONFOCAL SCANNING LASER OPHTHALMOSCOPIC IMAGING OF THE OPTIC NERVE HEAD IN GLAUCOMA?
JOHN DANIAS MD PHD AND JANET SERLE MD

LIPOPROTEIN(A) WITH AN INTACT LYSINE BINDING SITE PROTECTS THE RETINA FROM AN AGE-RELATED MACULAR DEGENERATION PHENOTYPE IN MICE
JAMES T. HANDA MD, MIZUKI TAGAMI MD, KATAYOON EBRAHIMI MD, GREGOR LEIBUNDGUT MD, ANNA JANIAK PHD, JOSEPH L. WITZTUM MD, AND SOTIRIOS TSIMIKAS MD

OCULAR PERFUSION PRESSURE VS ESTIMATED TRANS-LAMINA CRIBROSA PRESSURE DIFFERENCE IN GLAUCOMA: THE CENTRAL INDIA EYE AND MEDICAL STUDY
JOST B. JONAS MD, NINGLI WANG MD, AND VINAY NANGIA MD

PHENOTYPES OF RECESSIVE PEDIATRIC CATARACT IN A COHORT OF CHILDREN WITH IDENTIFIED HOMOZYGOUS GENE MUTATIONS
ARIF O. KHAN MD, MOHAMMED A. ALDAHMESH PHD, AND FOWZAN S. ALKURAYA MD

LONG-TERM OUTCOME OF HALF-DOSE VERTEPORFIN PHOTODYNAMIC THERAPY FOR THE TREATMENT OF CENTRAL SEROUS CHORIORETINOPATHY
TIMOTHY Y. Y. LAI MD FRCOPHTH, RAYMOND L. M. WONG MRCS, AND WAI-MAN CHAN FRCS

DIGITAL ALGORITHMIC DIABETIC RETINOPATHY SEVERITY SCORING SYSTEM
JASON S. SLAKTER MD, JEFFREY W. SCHNEEBAUM BS, AND SABAH A. SHAH MD MBA

DEVELOPMENT OF SELECTIVE LAMELLAR KERATOPLASTY WITHIN AN ASIAN CORNEAL TRANSPLANT PROGRAM: THE SINGAPORE CORNEAL TRANSPLANT STUDY
DONALD TAN FRCS(GLASG), MARCUS ANG FRCS(EDIN), ANSHU ARUNDHATI FRCS(EDIN), AND WEI-BOON KHOR FRCS(EDIN)

DRY EYE DISEASE INCIDENCE ASSOCIATED WITH CHRONIC GRAFT-VERSUS-HOST DISEASE: NONCONCURRENT COHORT STUDY
SHAHZAD I. MIAN MD, PAOLA DE LA PARRA-COLÍN MD, RAFAEL DE MELO-FRANCO MD, CHRISTOPHER JOHNSON MD, AND TONATIUH BARRIENTOS-GUTIERREZ MD PHD

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Buckley, Edward (2007)
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Caprioli, Joseph (1994)
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Chew, Emily (2005)
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Danias, John (2015)
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Elman, Michael (1996)
Elner, Susan (2002)
Elner, Victor (2002)
Erie, Jay (2003)
Esmaeli, Bita (2012)
Feldon, Steven (2004)
Ferris, Frederick (1996)
Fish, Gary (2008)
Flach, Allan (1998)
Flaxel, Christina J. (2013)
Fountain, Tamara (2014)
Francis, Peter (2011)
Fraunfelder, Frederick W. (2008)
Friedman, Alan (1984)
Gardner, Thomas (1995)
Gelender, Henry (2006)
Goldbaum, Michael (2005)
Goldberg, Robert (2011)
Golnik, Karl C. (2013)
Good, William (2001)
Gottsch, John (1996)
Gragoudas, Evangelos (1998)
Grand, M. Gilbert (2003)
Gross, Ronald (1999)
Grossniklaus, Hans (1998)
Haik, Barrett (1991)
Haller, Julia (1996)
Han, Dennis (2004)
Handa, James (2015)
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Hartnett, Mary (2010)
Hersh, Peter (2005)
Holland, Edward (1996)
Holland, Gary (2007)
Holz, Eric R. (2009)
Horton, Jonathan (1997)
Huang, Andrew (2007)
Huang, David (2013)
Humayun, Mark (2001)
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Jabs, Douglas (1995)
Jampel, Henry (2001)
Johnson, David (2006)
Johnson, Mark (2005)
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NECROLOGY

In Memorium

WILLIAM H. ANNESLEY, MD, ELECTED 1980
JOSE A. BERROCAL, MD, ELECTED 1980
RONALD M. BURDE, MD, ELECTED 1983
JAMES HOWARD ELLIOTT, MD, ELECTED 1980
RODERICK MACDONALD, JR., MD, ELECTED 1971
GEORGE O. WARING III, MD, ELECTED 1989
BARBARA ANNE WIARD STREETEN, MD, ELECTED 1982

WILLIAM H. ANNESLEY, MD

By *William S. Tasman, MD FACS*

Dr. William H. Annesley, Jr. passed away on Friday evening, October 24, 2014 due to pneumonia and other complications from a stroke he had suffered several months earlier. He was 89-years-old and is survived by his four children, William III, Barbara, Margaret and Joan, as well as eight grandchildren, three step-grandchildren and two great-grandchildren. Dr. Annesley was born on April 1, 1925 in the Kensington section of Philadelphia. He was a graduate of the prestigious Central High School in Philadelphia, which actually gave a degree rather than a diploma to its graduates. From there he went on to attend Haverford College, but was called back to service for the Navy because of World War II.

While at Central High, Dr. Annesley was an outstanding athlete and lettered in soccer, basketball and baseball. He continued to play these sports at Haverford College and was an outstanding left-handed pitcher, so good that he was scouted by the Philadelphia Phillies. When discharged from the service, Dr. Annesley went on to study medicine at Thomas Jefferson University School of Medicine. Like his father before him, he went on to become an ophthalmologist. He was a resident at Wills Eye Hospital and as sub-specialization began after World War II dedicated himself to diagnosis and management of vitreoretinal conditions.

Dr. Annesley became a Chief at Wills Eye Hospital and was Director of and one of the co-founders of the Wills Retina Service. He also served as Chief of Ophthalmology at Lankenau Hospital from 1972 to 1989 and was the Director of the Wills Retina Service for those same years. He held the academic rank of Professor of Ophthalmology at Thomas Jefferson University School of Medicine.

Although Dr. Annesley managed all forms of retinal diseases and operated on innumerable retinal detachments throughout his career, he had a special interest in laser treatment, especially for macular degeneration in the days before we had the medications that are available today. He had originally learned what came to be laser treatment of the retina when he went to Bonn, Germany in the early 1960's to learn how to use the Light Photocoagulator, which had been developed by Professor Gerd Meyer Schwickerath. It was the predecessor to the laser for treatment of the retina.

Dr. Annesley loved to teach and he was outstanding in training well over 120 Retina Specialists, many of whom have also become leaders in their field in the United States, Canada, and other parts of the world.

Dr. Annesley has received many awards for his accomplishments and in 1968 was one of 68 charter members of the Retina Society, which first met in Swampscott, Massachusetts. In 1980 he became a member of the American Ophthalmological Society (AOS). His thesis was on "Peripheral Exudative Hemorrhagic Chorioretinopathy". It is still often cited today.

Dr. Annesley was a devoted husband and wonderful father. His wife, Nancy Lee Harlan and he had been married for 43 years when she passed away in 1993 after a prolonged and courageous fight against breast cancer. Nancy had a great sense of humor and together they made a wonderful team. Bill never remarried and one of his favorite pastimes after he retired was watching his grandchildren play team sports.

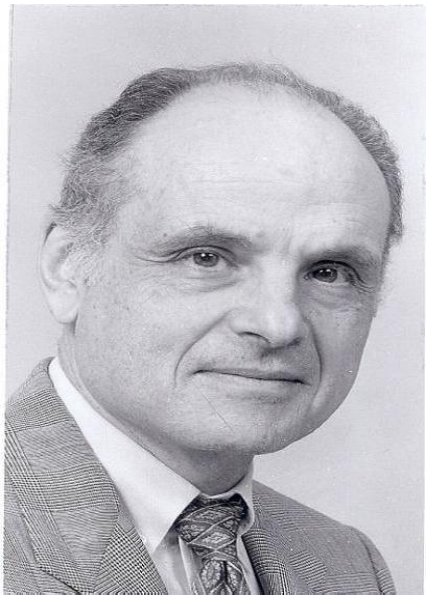
Together Bill and his children were tightly knit and supported each other loyally throughout the years. At Bill's Memorial Service, his son Billy had prepared a small pamphlet on what it means to be a father. There were eight categories, but as you read through all

eight Billy captured his father perfectly. Two that I specifically remember related to golf because both Billy and his father loved to play the game. Bill used to say, "On the weekends, it was low balls in the morning and highballs in the evening". Billy tells the story of playing golf with his Dad at the Philadelphia Country Club and hitting a very bad drive on the 8th hole. In his frustration, he fell down on the fairway. He mentions that his father did not yell but simply and calmly observed, "I've never seen Arnold Palmer do that." Billy accepted this lesson in golf etiquette with grace. The other one that I will never forget is, one night after a day of golfing with friends in Ireland, Billy decided to go out for a beer or two with some of the younger guys while his Dad decided to go to bed. Billy relates how he stumbled into the room very late and collapsed into bed whereupon his Dad called out, "Where have you been!? What time is it?" I said, Dad, I'm 44". At that point Billy realized that once you are a Dad you are always a Dad.

Dr. Annesley will always be remembered for his contributions in the field of retina, but he will also be known as the epitome of a kind, considerate gentleman and wonderful friend. He was deeply loved by his patients and that affection was reciprocated, something that was obvious if you saw him interacting with those he cared for. There is no question that he will be greatly missed by his colleagues, friends and family.

RONALD M. BURDE, MD

By *Steven A. Newman MD*



On February 23, 2015 The American Ophthalmologic Society, the Academy of Ophthalmology, the American Neurological Society, and the profession of Ophthalmology lost a truly special person, Ronald Marshall Burde. Although he considered himself a neuro-ophthalmologist, he was far more. Although he had no official neurology training, he was recognized by inclusion in the American Neurological Society, as well as a member of the American Association of Neurological Surgeons. He, like Frank Walsh, recognized that neuro-ophthalmology could be an umbrella, not just for ophthalmology, but for neurology and general medicine.

As the longtime director of the consult service at Washington University Barnes Hospital, Ron set an example for his residents that neuro-ophthalmology could be far more than diagnosis and audios. While David Cogan emphasized the advantage of not having to worry about surgery and therapeutic decisions, Ron embraced the possibility of, not only diagnosing unusual conditions, but also planning and carrying out medical and even surgical intervention. His outpatient service was truly an example of the Forest Gump approach; one never knew what would walk in the door. He would see the most difficult patients from every ophthalmic subspecialty, and often had significant insight, not only into diagnosis, but into potential therapies.

Ron was born in New York, New York in September of 1938, grew up in Connecticut, and attended the Massachusetts Institute of Technology. He received his medical education at Jefferson Medical College in Philadelphia, followed by house staff training at Jefferson Medical College, where he was honored as the "most outstanding intern." Under the tutelage of chief resident Mort Smith and professor Bernie Becker, he was an Ophthalmology resident at the Washington University Medical Center in St Louis. Following his fellowship training with Andy Gay, he was appointed to the faculty at Washington University rising to Professor of Ophthalmology in 1975. In 1988 he moved to New York City where he became Professor and Chairman at the Albert Einstein College of Medicine in the Bronx.

His interest in education extended not only to his primary role in the realignment of the administration of the Academy of Ophthalmology, but also in his serious interest in the educational arm of the Academy. First and foremost Ron saw himself as a teacher. He ran the basic neuro-ophthalmology course at the Academy of Ophthalmology from 1973-1981 and served as Course Director in multiple neuro-ophthalmology instruction meetings across the country. He served two stints on the BCSC as both chairman of Optics, Refraction, and Contact Lenses, but also Neuro-Ophthalmology. He served on the Program Committee, OKAP Committee where he became Chairman, and also Chairman for the Planning for Continuing Education in Ophthalmology Committee. He served seven years as Associate Secretary for Continuing Medical Education, and later as Special Advisor to the Continuing Education Committee. Even later in his career, he was astute and up to date enough to be named to be Chairman of the New Technologies Task Force.

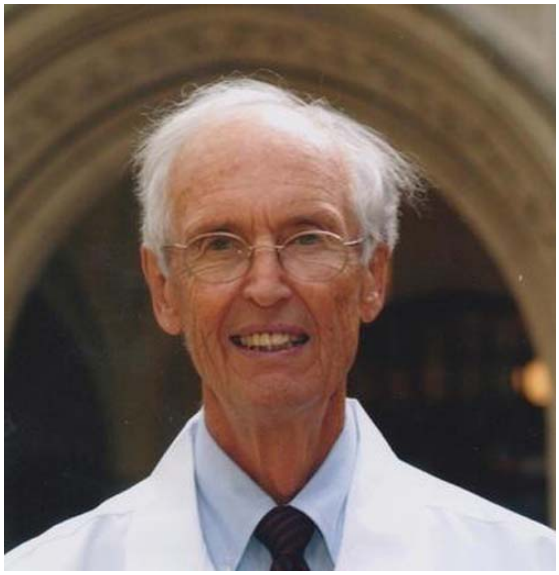
He was one of the early members of the neuro-ophthalmology/pathology club that became the Frank Walsh Society and later helped integrate it into the North American Neuro-Ophthalmology Society. Following Lawton Smith he served as the second Editor in Chief of the Journal of Neuro-Ophthalmology. He was also on the Editorial boards of Ophthalmology, American Journal of Ophthalmology, Journal of Clinical Neuro-Ophthalmology, Survey of Ophthalmology, and was a special consultant to the Editorial Board of the Journal of Neurosurgery. He was a member of the American Academy of Ophthalmology, American College of Surgeons, American Ophthalmological Society (since 1983), American Medical Association, American Neurologic Association,

ARVO, Frank Walsh Society, International Society of Neuro-Ophthalmology, and medical societies in and around New York City. He was recognized with the Senior Honor Award from the Academy of Ophthalmology and Helen Keller service award. He was involved with Lawton Smith at The Bascom Palmer Neuro-op Update Courses as well as the New Orleans Academy of Ophthalmology. He served as visiting professor across the United States and Canada and spoke internationally in Switzerland, South Africa, Israel, Holland, The Philippines, and Australia. He was invited to deliver multiple named lectureships, edited or wrote ten books, numerous book chapters, and was author or co-author on more than two hundred articles covering an extremely broad range of topics. Outside service included appointment as Captain in the Medical Corp and U.S. Army Reserve. At Washington University and Albert Einstein he trained thirty one fellows. He was involved with the American Board of Ophthalmology, serving as member, Director, and ultimately Chairman. He was also an active member and President of the Association of University Professors and Ophthalmologists.

I will always remember Ron as a mentor, father figure, and role model. His influence will long outlast his eventful life, or to quote one of my medical students who recently was honored as the Teacher's Teacher at the University of Virginia, "remembering to thank our teachers for what they have provided for us every day in every way." It is "easy to fill a student's mind, it is hard to open it." We will miss this "rare Burde."

James Howard Elliott, MD

By *Sean Parnell Donahue, MD, PhD*



James Howard Elliott MD passed away Friday, April 17, 2015 in Nashville, Tennessee. He was 87.

Jim was born in Oklahoma in 1927, and received his Bachelors of Arts degree from Phillips University in Enid, Oklahoma. He matriculated at the University of Oklahoma Medical School and graduated *Summa Cum Laude* in 1952. After a residency in Oklahoma, Dr Elliott practiced comprehensive ophthalmology for several years prior to pursuing a fellowship in ocular immunology at Harvard. He spent four years on the faculty at Harvard prior to being recruited to Vanderbilt University in 1966. He was Vanderbilt's first full time faculty member in the division of ophthalmology in over 50 years. He then became director of the Ophthalmology Training Program, which had two residents per year. Dr Elliott was able to convince the Dean of the Medical School to grant full Departmental status to Ophthalmology in 1970, and he became the first Department Chair, a position he held for over 20 years.

Dr Elliott was a leader in teaching and patient care in Ophthalmology at Vanderbilt. He instituted weekly Grand Rounds and a Saturday morning lecture series. He obtained an operating microscope and was one of the first academic leaders to insist that trainees use the microscopes rather than surgical loupes for their anterior segment practice. Jim built a solid cornea division, recruiting Danny Jones and Denis O'Day, who both became giants in their field. With Dr Steven Andrews, they applied for and were awarded Vanderbilt' s first NIH vision research grant.

Dr Elliott was a national leader in ophthalmology. He was the Chairman of the Section of Immunology and Microbiology for ARVO from 1972-1973, and served on the ARVO Board of Trustees from 1974-1978. He was Vice President of ARVO in 1978. He was elected to the Board of Trustees of the AUPO and served from 1972-1976, and was Chairman of the Board of Trustees in 1978.

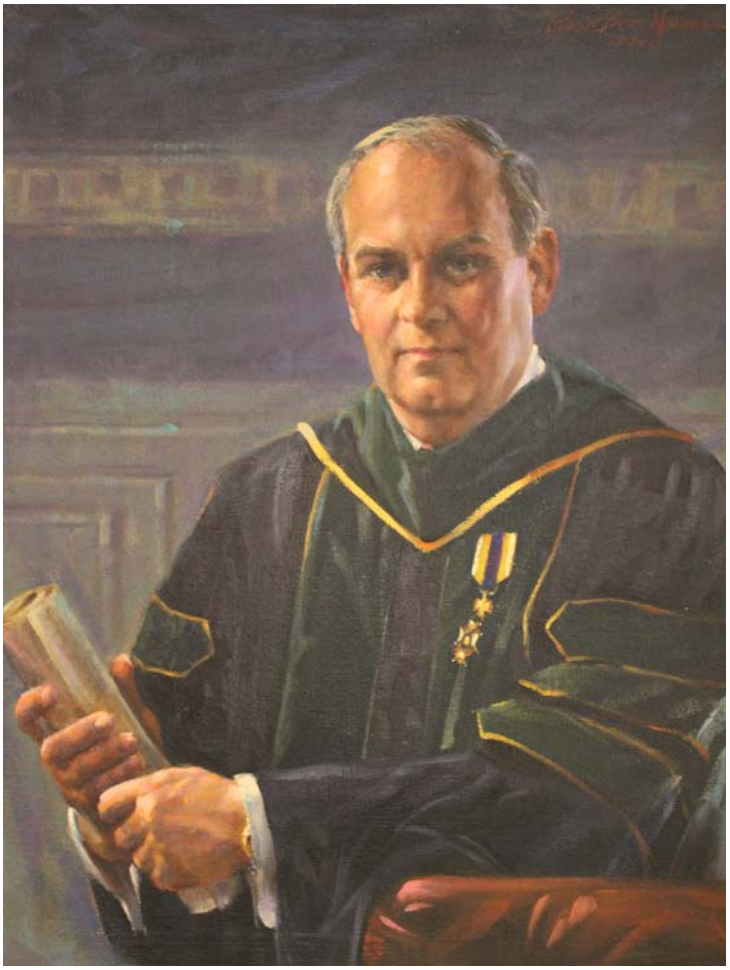
Dr Elliott was a prolific contributor to the scientific literature, contributing articles in many areas of ophthalmology. His first paper (in 1963) was a case report of a trochlear nerve palsy following spinal anesthesia in the Journal of the Oklahoma State Medical Association; thirty-two years later was his last: a report on the changing incidence of retinopathy of prematurity. Between these two were 66 peer-reviewed manuscripts, first with Dr HW Leibowitz, then with Doctors Danny Jones, and Denis M O'Day, and finally two in the early 1980s with his beloved wife Roberta Myers-Elliott. The vast majority dealt with infectious diseases of the cornea and the immune response to infection. Perhaps none was more contentious than the series of 13 cases of permanent vision loss following radial keratotomy published in *Ophthalmology* in 1986.

Jim was an avid tennis player and golfer, and lived by the mantra "You're only as good as your second serve." He was loved by his former residents and fellow colleagues at Vanderbilt. Paul Sternberg Jr, MD, Chair of the Department of Ophthalmology and Visual Sciences, and Chief Medical Officer at Vanderbilt University Medical Center, noted "Jim was a great doctor, teacher, and friend. He always seemed to be in good spirits. When I needed some sage advice, Jim was always there for me." Longstanding Vanderbilt faculty member and former colleague Karla Johns remembers that Jim was "a smile as wide as the Oklahoma sky that nurtured him."

Jim is survived by his wife Roberta, 3 sons, 1 daughter, and two step children, as well as 8 grandchildren and 6 great-grandchildren. He has left what his successor Paul Sternberg terms "a forever legacy as the father of Vanderbilt ophthalmology, and will be deeply missed."

RODERICK MACDONALD, JR., MD

By *M. Edward Wilson, MD*



Roderick “Rod” Macdonald, Jr. MD, a South Carolina native, served with distinction as Ophthalmology Department Chair at two different institutions. He then returned to his home state to become the first Dean of the University of South Carolina Medical School, deftly guiding the state’s controversial second medical school through its tumultuous early years. He is remembered as a founding father of the University of South Carolina’s medical school in Columbia. Owing, in part, to his tenacity and vision, the school he helped lead through its infancy is still thriving today. His contemporaries remember him as extremely affable and engaging but strong and forceful when needed. He was a helpful and empathic listener and colleague to his faculty, staff, and students. Others remember his signature pocket-handkerchief and the huge MontBlanc fountain pen that he always used to sign acceptance letters to medical school applicants. His car proudly displayed a personalized “USCMD1” license plate.

An active American Ophthalmological Society member from his thesis acceptance in 1971 until well into his emeritus years, Dr. Macdonald passed away peacefully, in Columbia, SC, surrounded by his family, on November 24, 2014, at the age of 88.

Born in Charleston in 1926, he spent his childhood in Charleston, Columbia, and Rock Hill. He graduated from Davidson College and earned his MD at the Medical University of South Carolina (MUSC). His internship was at Baltimore City Hospital in Baltimore, Maryland followed by an ophthalmology residency at Tulane School of Medicine in New Orleans, Louisiana, where he also served as chief resident and then as a fellow in corneal transplant surgery. After a tour of duty as a First Lieutenant in the United States Army Medical Corps at Fort Knox, Kentucky, he moved to Louisville, Kentucky where he became an Assistant Professor at the University of Louisville School of Medicine. He rose through the ranks to become Professor of Ophthalmology and served as Department Chair from 1965-73. He was a key figure in the establishment of the Kentucky Lions’ Eye Research Institute at the University of Louisville. In 1973, Dr. Macdonald moved to Richmond, Virginia where he became the Ophthalmology Department Chair at Medical College of Virginia.

In September 1976, Dr. Macdonald was appointed Dean of the University of South Carolina School (USC) of Medicine, nearly a

year before the school's first class of future doctors enrolled. Rod Macdonald, whose dad was a one-time president of the South Carolina Medical Association, was aware of the need to increase the number of physicians in South Carolina. He believed in the new school and guided it with a steady hand despite many political efforts in Columbia to stop it. He maintained morale, recruited additional faculty, developed community relationships, acquired and built needed infrastructure, implemented a curriculum and attracted excellent students. One of his former associate deans said that his photo should accompany the dictionary's definition of "medical school dean". After his service as Dean, Dr. Macdonald returned to the full time practice of clinical ophthalmology in Richmond. In 1992, at retirement, he and his wife, Helen, returned to Columbia to be closer to family.

In 2001, Dr. Macdonald was awarded the title of Distinguished Professor Emeritus and Dean Emeritus at the USC School of Medicine. Dr. Layton McCurdy, Dean Emeritus at MUSC remembers Rod Macdonald, even in retirement, working hard to facilitate cooperation and collaboration between the often-distant South Carolina medical schools. From all accounts, Dr. Roderick Macdonald was a strong leader and a consummate clinician. Under an imposing public persona, he is said to have been warm and personable in one-on-one interactions. It is said that he loved to hear and tell jokes and stories. He was a caring husband, father, and grandfather. He was, in many ways, the quintessential southern gentleman.

BARBARA ANNE WIARD STREETEN, MD

By *Ann Barker-Griffith and Daniel Albert, MD*

Barbara Anne Wiard Streeten, M.D., died on February 8, 2015 of complications from Alzheimer's disease, just 23 days short of her 90th birthday. Barbara's cherished husband, David, a dapper Englishman of South African birth, predeceased her.

The brilliant Barbara graduated early (at age 16) from Revere High School in Revere, MA, as valedictorian. She received her BA at age 20 (1945) from Tufts University and M.D. in 1950 from Tufts University Medical School. Her training included residencies in Pathology (Boston City Hospital) and Ophthalmology (Wayne County Hospital and University of Michigan), and a fellowship in Ophthalmic Pathology at the Massachusetts Eye and Ear Infirmary. She was on the Ophthalmology faculty at the University of Michigan from 1956-60. After moving with her husband, Dr. David H.P. Streeten, to Syracuse, New York in 1960, she spent four years as a full-time mother to their three small children. She joined the Ophthalmology faculty at Upstate Medical University in 1964, where she was Director of the Eye Pathology Laboratory from 1967-2008, retiring at the age of 83. She authored more than 119 publications and book chapters, 68 published abstracts, with important contributions in pseudoexfoliative disease of the lens, the protein composition of the zonule, and many genetic disorders.

Barbara, born in 1925, was a child of the Great Depression and her ever patient husband, David waited long hours for her after her long day to drive her home after his busy Endocrinology Clinic. They would never dream of owning two cars at once, even though they could afford it!

David's characterand love of Barbara is exemplified by his waiting for Barbara in the Eye Pathology Laboratory long after everyone else had gone home when he would finally say "Barbara, just make a diagnosis". Barbara's character, in turn, is shown by her reminding David and the remaining tired, hungry medical students, of her favorite Murphy's Golden Rule: "Whoever has the gold makes the rules." That tattered poster of Murphy's Law still hangs in the Pathology Lab today and reminds us all of her artful ability

to put her research thoughts onto paper. This ability permitted her to be artfully and continuously funded for 27 years, beginning with the receipt of her first NIH grant in 1975 (at the age of 50) entitled "The Fiber-Gel Structure of the Ocular Zonule".

As an eminent scholar and scientist she was a member of the American Ophthalmological Society, the Verhoeff-Zimmerman Society, and the Eastern Ophthalmic Pathology Society and others where she forged lifetime friendships. Her honors include the SUNY Presidents Award for Excellent Leadership in Research, the SUNY Chancellor's Award for Excellence in Scholarship and Creative Activities, and the Zimmerman medal, the highest honor in Ophthalmic Pathology. She served in many leadership positions for prestigious ophthalmic research societies and was an invited lecturer at numerous institutions in the United States and abroad. Her collaborations with students, residents, and faculty members stimulated the department, as well as her former medical students and residents. She served as a role model for young women entering academic medicine.

Barbara loved the ocean, sailing and body surfing. Being the consummate teacher she was, she taught her lab assistants and fellows to body surfing in Sarasota during ARVO. We faithfully learned this from her and all the good works she taught us. She was an inspirational teacher, whose students and residents stayed in close contact long after their training.

Barbara's husband of 48 years, Dr. David Streeten, a prominent endocrinologist and faculty member of Upstate Medical University for 50 years, shared her passion for research, travel, family and students. By example, they taught their children, grandchildren, many students and fellows, the importance of finding their career passion and also maintaining family closeness. Their proudest achievement was their three children and seven grandchildren. The entire extended family spent every August at their Fall River summer home on the ocean. Barbara wrote her last NIH grant there so she could keep fulfilling Murphy's Law.

JOSÉ A. BERROCAL VÉLEZ, MD

By *Eduardo C. Alfonso, MD*

José A. Berrocal Vélez, passed away on January 2, 2015. Born and raised in Puerto Rico, he and his beloved wife of 58 years, Hortensia (Purusa) moved to Santurce, Puerto Rico, where they raised their family and he practiced medicine for more than 40 years. Dr. Berrocal devoted his life to his family and ophthalmology. Throughout his medical career, he was committed to generations of patients and hundreds of students.

Fondly known as "Pepin," Dr. Berrocal is predeceased by his beloved son José Manuel, and survived by his wife and two daughters: Maria Hortensia (Luis Acabá), and Audina "Nina" (Steve Tannenbaum); and five loving grandchildren: Luisito, Alex, Julia, Pablo and Sofia.

Dr. Berrocal received his undergraduate and medical degrees from the University of Puerto Rico. Following internship and residency in ophthalmology at the Medical Center of the University of Puerto Rico, in 1964 he pursued a retinal fellowship at Bascom Palmer Eye Institute, where he was the first fellow to train under Dr. Edward W.D. Norton, Bascom Palmer's founding chairman. This was followed by a second fellowship in Boston with Dr. Charles Schepens. Following his fellowships, he chose to go into private practice in Puerto Rico and was the island's first retina specialist. He actively participated in the department of ophthalmology at the University of Puerto Rico through teaching and as Chairman. He held leadership positions in national and international specialty societies. He was also involved in collaborative clinical research, including the Diabetic Retinopathy Study (DRS) and Early Photocoagulation for Diabetic Retinopathy (ETDRS). He was very active in teaching throughout Latin America as both an invited speaker and surgeon. Pepin was fondly remembered for delivering his lectures in perfect "spanglish."

Following in their father's footsteps, a generation later Maria and Nina also received their medical degrees and completed fellowships at Bascom Palmer. Maria (fellow, 1992) entered private practice with her father and became an assistant professor at the University of Puerto Rico where her father enjoyed a 40-year affiliation. Following her retinal fellowship in 2000, Nina joined the Bascom Palmer faculty as a specialist in vitreoretinal diseases and pediatric clinical care.

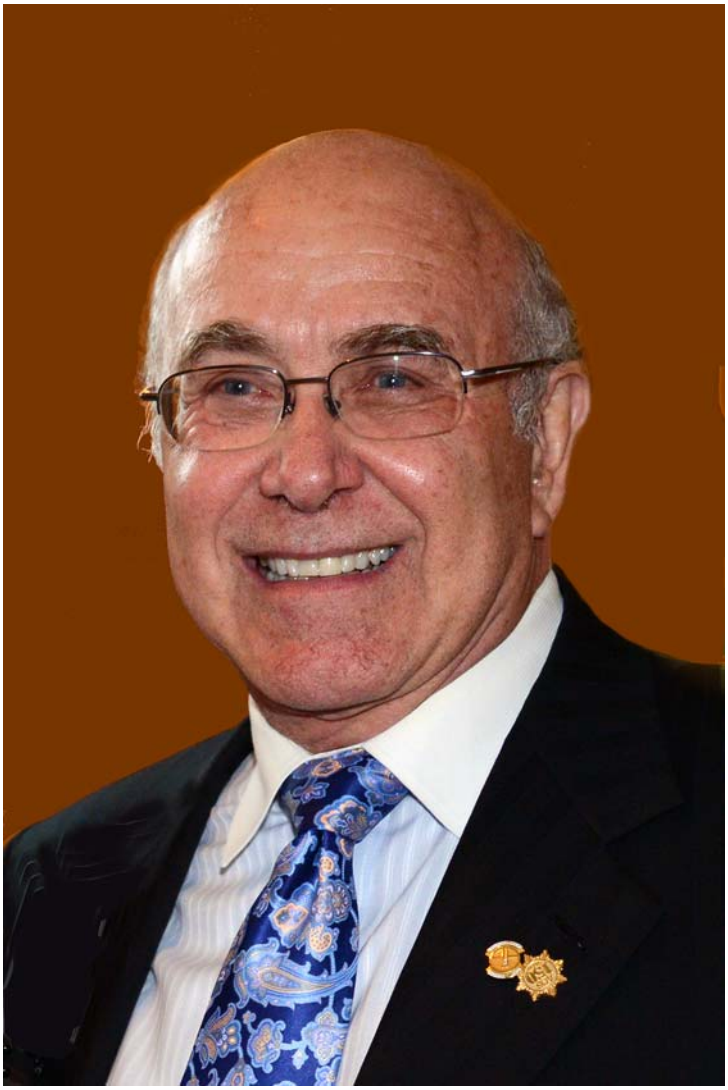
To honor the ophthalmology legacy started by José Berrocal and his 40-year relationship with Bascom Palmer, in 2011 the Berrocal family provided the leading gift to completely renovate the auditorium in the Edith and Earl Retter Educational Center. It is now known as the José Berrocal Auditorium. The Berrocal Auditorium serves as home to Grand Rounds and hosts thousands of faculty, staff, and students for seminars, research forums and other special events.

Dr. Berrocal was an avid tennis player and was recognized as a talented chess player. He will be remembered for the compassionate care he provided to thousands of patients. Dr. Berrocal's dedication to the field of ophthalmology is evidenced by his passion for the profession, devotion to his patients, and enthusiasm for patient care that he lovingly instilled in his daughters.

Memorial services were held in Puerto Rico on Sunday January 11, 2015.

George O. Waring III, MD

By *Hans Grossniklaus, MD*



George O. Waring III MD was born in Buffalo, New York, and died in Atlanta, Georgia, January 27, 2015. He attended Wheaton College and received his MD from Baylor Medical College. He was a rotating intern at Ben Taub Hospital in Houston, Texas. He did his ophthalmology residency at Wills Eye Hospital and was a Heed Fellow in cornea disease and surgery at Wills. Dr. Waring was appointed as Assistant Professor of Ophthalmology at the University of California, Davis in 1974. He joined the faculty at Emory University in 1979 and became a tenured Professor of Ophthalmology and Director of Refractive Surgery until 2004, after which he practiced privately in Atlanta. During 1992, Dr. Waring was a Fogarty Senior International Scholar from the NIH in Hotel Dieu Hospital, Paris, and served as Chairman of the Department of Ophthalmology at the El Maghraby Eye Hospital, in Jedda, Saudi Arabia, from 1993-1994. The focus of his practice and career was cornea disease and surgery, including most importantly, refractive surgery. Dr. Waring was the Designer and Principal Investigator of the first physician-sponsored investigational device exemption (IDE) and pre-market approval (PMA) in the ophthalmic branch of the FDA, which was the first formal trial of laser in situ keratomileusis (LASIK) in the United States from 1995-1999.

Dr. Waring published over 250 peer reviewed articles, 60 book chapters, and 250 brief communications. He received the Life Achievement Honor Award from the American Academy of Ophthalmology, the Society of Heed Fellows Outstanding Ophthalmologist Award, a Gold Medal from the 5th International Congress on Cataract and Refractive Surgery in Florence Italy, two gold medals for contributions in international ophthalmology from the Pan Arab Council of Ophthalmology, the Castroviejo Medal, and the Lans, Barraquer, Kritzinger and Lifetime Achievement Awards from the International Society of Refractive Surgery.

Dr. Waring was a world renowned refractive surgeon and investigator. He was the Principal Investigator of the Prospective Evaluation of Radial Keratotomy (PERK) study, was editor-in- chief of the *Journal of Refractive Surgery* (1989-2010), authored the seminal textbook "*Refractive Keratotomy for Myopia and Astigmatism*", and appeared on television shows to discuss refractive surgery such as 60 Minutes, Nightline, 20/20, and Good Morning America.

Dr. Waring was an avid outdoor enthusiast and adventurer. He was an expert kayaker, snow skier, and played squash regularly. He traveled the world, and as a mountaineer accomplished a first-ascent of the Kang Yaja 20,000 foot peak in the Himalayas. He also climbed Aconcogua in Argentina, the highest mountain outside the Himalayas, as well as Mount Kilimanjaro and the Matterhorn. He was a DiveMaster and also went on African safaris. He lived life fully.

First and foremost, Dr. Waring was a consummate teacher. His spontaneous, extemporaneous "chalk talks" of various corneal diseases and conditions were superior to the best prepared digital presentations. He developed memorable mnemonics to remember the differential diagnoses of corneal diseases. He would classify and categorize corneal disease processes based on a true understanding of the condition, rather than a superficial rote memorization. He would routinely make astute comments at grand rounds presentations, regardless of the topic. He was an expert lecturer, and his deliveries would be timed in a dramatic fashion for maximum effect. He was a warm, charming colleague, always delightful, and full of wonder to the end. He is survived by his sons George O. Waring IV, MD of Charleston, South Carolina, John Timothy Waring, MD, of Sacramento, California, daughter Joy Waring Harty of Atlanta and adopted son Matthew George. George O. Waring III MD, adventurer, teacher, leader, innovator, colleague and friend, will be missed.

MINUTES OF THE PROCEEDINGS

One Hundred and Fifty-First Annual Meeting

May 15-17, 2015

The ONE HUNDRED AND FIFTY-FIFTH ANNUAL MEETING of the American Ophthalmological Society (AOS) was held at The Hotel Viking, Newport, Rhode Island

On May 15, 2015, Friday, President Richard P. Mills, MD called the opening session to order. The program began with the following AOS-Knapp symposium.

SYMPOSIUM: INNOVATIONS IN MEDICAL EDUCATION

1. Introduction: Jerry Sebag, MD, FACS, FRCO, FARVO
2. What Happened to my Medical School?: Edward G. Buckley, MD
3. Creating Future Leaders: Darrell G. Kirch, MD
4. Transforming Resident Education: Benjamin A. Alman, MD
5. Social Media in Medical Education and Health Care: Farris Timimi, MD
6. Educating the World's Ophthalmologists: Bruce E. Spivey, MD

The Meeting Was Continued With The Following Scientific Program:

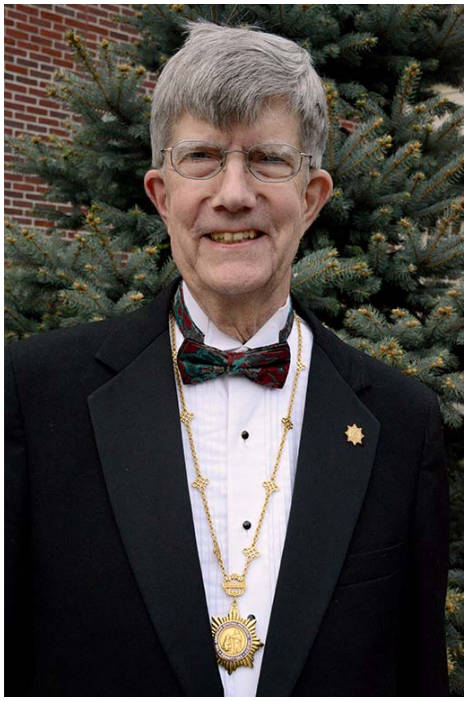
1. TNFAlpha Induced Choroidal Neovascularization Inhibited By Active Rap1 GTPase. Haibo Wang, **Mary Elizabeth Hartnett**
2. Optical Coherence Tomography Angiography Of The Peripapillary Retinal Circulation In Glaucoma. **David Huang*♦**, Yali Jia♦, Liang Liu, Beth Edmunds, Lorinna Lombardi♦, Ellen Davis, Hana Takusagawa, **John C. Morrison*♦**
3. 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*♦**
4. Nailfold Microvascular Abnormalities In Primary Open-Angle Glaucoma. **Louis R. Pasquale ***, Aiai Ren, Akiko Hanyuda, Jae Hee Kang, Michael Giovingo, Paul Knepper
5. 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

Bold = AOS Member, * = Presenter, ♦ = Financial Disclosure

EXECUTIVE SESSION, SATURDAY, MAY 16, 2015

Richard P. Mills, MD**:** Good morning everyone I'd like to call the order of this Executive Session of the 150th Meeting of the American Ophthalmological Society.

The Executive Vice President, Dr. Tom Liesegang will now give his report:



2015 AOS PRESIDENT RICHARD P. MILLS, MD

REPORT OF THE EXECUTIVE VICE-PRESIDENT 2015

THOMAS J. LIESEGANG MD:There are now 222 active members and 144 emeritus members with the bylaws permitting up to 275 active members.

The investments of the Society have increased over the past several years and presently stand at a historic high. The Society remains in a strong financial condition. The Council is actively engaged with the Society's financial managers at Vanguard, including direct dialog during the Council meetings. The AOS has an investment committee and an audit committee to monitor the financial activities of the Society; these committees are pleased with the present financial status of the AOS. A clean audit report for 2014 has just been completed.

THOMAS J. LIESEGANG MD

The three sources of income for the AOS are membership dues, annual meeting registration fees, and investment income that are derived from 3 Funds – The AOS Fund, the Charitable, Educational and Scientific Trust Fund, and the Knapp Fund. The investment income from the 3 Funds continues to subsidize the meeting, the Transactions, and the membership activities, in accordance with the bylaws of each Fund. The Knapp Fund supports the Knapp symposium held during the Annual Meeting. The Council is careful to use the bequeathed funds following the legal guidelines for their use. The Council monitors all the expenses in an attempt to maximize the AOS holdings.

The AOS Council recommends no increase in dues next year.

The AOS is preparing for the 152nd meeting at the Broadmoor in Colorado Springs next year.

REPORT FROM THE COUNCIL CHAIR

JAY ERIE, MD: In 2014 to 2015, the Council consisted of myself, Ed Wilson, Anne Coleman, Woody Van Meter, and Marco Zarbin. The Council's duty is to supervise the day to day operations of the AOS and oversee the financial status of the AOS funds. The Council met on June 2, 2015 and at that time received and accepted a clean audit of the AOS fund; the Charitable, Educational, and Scientific Trust fund, and the Herman Knapp Testimonial fund.

I would like to take this space to encourage you to attend and participate in the 152nd Annual Meeting of the AOS to be held in Colorado Springs, Colorado. The 152nd Annual Meeting will include free paper and poster presentations by the members. Similar to last year, the meeting will provide CME credit, so it is essential that members submitting papers include the appropriate information with their abstract submission. This year's Knapp Symposium will be on "Innovative Paradigm Shifts in Ophthalmology" and the Saturday Symposium will be on "Healthcare Delivery in 2016". The second Frederick Blodi lecture is to be given by Elias I. Traboulsi, and will be "Zonules and Molecules: The Underlying Pathophysiology of Ectopia Lentis.". The meeting should prove to be outstanding. It has been a great privilege and honor to serve the AOS these past five years. Its leadership next year is in the very capable hands of Ed Wilson M.D.

REPORT OF THE AOS AUDIT COMMITTEE

RICHARD PARRISH, MD: Richard Parrish is the Chair of the AOS Audit Committee this year with additional members Jay Erie (Council Chair) and Thomas Liesegang (EVP), Hans E. Grossniklaus, Incoming EVP), and David J. Wilson, MD. The Audit Committee met on June 2, 2015 with additional guests including Nathan Farris, Kelly Anderson, and Daniel Figueredo, CPA, 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 2014 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 increased from the prior year primarily as a result of an increase in investments due to favorable market conditions. Dr. Parrish 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. Parrish adjourned the meeting of the Audit Committee without any having determined any irregularities.

AOS COUNCIL FROM LEFT:
THOMAS J. LIESEGANG, WOODFORD S VAN METER,
RICHARD P. MILLS, ANNE L. COLEMAN,
M EDWARD WILSON, JAY C. ERIE, EMILY Y. CHEW

REPORT OF THE COMMITTEE ON THESES

John D. Gottsch, MD: Chair and reporting member, Committee Members include: John Thompson, MD and Dimitri Azar, MD

The AOS Thesis Committee reviewed 17 thesis submissions in 2015. Of these, 11 were new, 6 were first time resubmissions from the past two years. There were no second re-submissions. Of the 11 new submissions, none were accepted, 7 were returned for minor revision, meaning likely acceptance this year, 4 were returned for major revision, requiring a resubmission and re-review by the committee, and none were rejected.

Of the 6 revised first time re-submissions, 3 were accepted without revision, and 2 were returned for minor revision and 1 was rejected.

There were no second re-submissions.

In total, of the 17 submissions this year, 3 were accepted, 9 required only minor revision, and 4 were returned for major revision and 1 was rejected.

REPORT OF THE EDITOR:

EMILY Y. CHEW, MD: We applied unsuccessfully for an impact factor for the Transactions of the American Ophthalmological Society. We will perhaps try again in another year as we have truly fulfilled all the requirements needed to obtain an impact factor. We may need to demonstrate that we have indeed a history of having international contributions and an editorial board that has been active in reviewing our manuscripts. With the help of our librarian resource at the National Institutes of Health, we calculated our potential impact factor could be as high as 2.

Again, we would like to remind our members that we no longer allow duplicate publication of the AOS theses. This information is obviously important as our current members nominate new members and hopefully contribute to the planning and writing of the new nominee's theses. It is imperative that this practice, which was previously allowed and perhaps encouraged, be stopped now. We have recently received notice from the Committee on Publication Ethics (COPE) and other groups that monitor ethical publishing that there were duplicated publications in the TAOS and other ophthalmology journals. For example, 2 publications of the same subject matter with almost identical titles as well as identical authorship were published in 2006, prior to our current rule.

Finally, we are rewriting the theses guidelines for the current members and our future candidates. It is imperative that the candidates read through the guidelines for the thesis preparation. In particular, there has been more scrutiny on the process of informed consents for clinical investigators. Although we cannot fully monitoring the practices of obtaining informed consent, we have added language in the instructions for the authors to submit when conducting clinical research that requires human subjects' informed consents and of course approval from the institutional review boards for human subjects research.

Again, it is my honor and privilege to serve as the editor of the TAOS.

2015 AOS PRESIDENT RICHARD P. MILLS, MD AND SPOUSE KAREN COVINGTON

REPORT OF THE COMMITTEE ON PROGRAMS

EDWARD BUCKLEY, MD: The Committee on Programs included Edward Buckley, Jerry Sebag, David Tse, and Eduardo Alfonso with guidance from Thomas Liesegang (Executive Vice President) and Jay Erie (Council Chair). The 151th AOS meeting in Newport, Rhode Island combined the timely topics of health care reform and innovations in medical education with advances in ophthalmology research and clinical care. The inaugural Frederick Blodi Lecture honoring a mid –career AOS was delivered by Timothy Olson, MD.

The Committee on Programs divided the program into 4 parts including:

- Herman Knapp Symposium with invited speakers
- Frederick Blodi Lecture
- The Saturday Symposium with invited speakers
- Podium and Posters presentations based on abstracts submitted

Friday, May 15, 2015- the Herman Knapp Symposium, focused on **"**Innovations in Medical Education" with the following invited speakers:

- Jerry Sebag, MD: Introduction
- Edward Buckley, MD: "What happened to my medical school?"
- Darrell Kirsch., MD – "Creating Future Leaders"
- Ben Alman, MD – "Transforming Resident Education"
- Farris Timimi, MD—"Health Care Social Media and Digital Identity for Ophthalmology: Opportunity, Risk and Reward"
- Bruce Spivey, MD—"Educating the World's Ophthalmologists"

Saturday, May 16, 2015. Frederick C. Blodi Inaugural Lecture:
Timothy Olson, MD "The Macular Degeneration Complex, "

Symposium: Health Care Reform in 2015

- Jay Erie, MD: Introduction
- Kathleen Harrington "Navigating the Changing Health Care Policy and Political Landscape"
- Michael Repka, MD "Health Care Reform and Ophthalmology: A view at 5 years"

18 Papers and 17 posters were presented.

TIMOTHY OLSON, MD, FREDERICK C. BLODI INAUGURAL LECTURER

REPORT OF THE COMMITTEE ON MEMBERSHIP

JOEL S. SCHUMAN, MD, FACS: The Committee consisted of Joel S. Schuman,William Mieler, Mary Elizabeth Hartnett and Michael Siatkowski. The Committee met by conference call September 1, 2015 with Hans Grossniklaus (ex officio).We reviewed 20 applications; 18 were strong candidates. The demographics were as follows:

- 13 men, 7 women
- Age Range: 44 – 60
- Academic Rank
- Professor and chair: 3
- Professor and vice chair: 1
- Professor: 11
- Associate professor: 5

Fifteen applications were from the USA. International applications came from Australia, Canada, France, Greece, Singapore. Numbers of peer reviewed publication by candidates ranged from a low of five to a high of 1023. Each candidate was discussed in detail and presented to the Board of the AOS for review on October 2, 2015 in Charleston, South Carolina. Following Marian Macsai's precedent, each candidate was presented to the Board using the following format:

- Name
- National/International
- Rank
- Specialty
- Sponsors
- # per reviewed publications
- Ability to write thesis
- Boards or Directorships
- Comments
- Recommendations

It was noted that the AOS board continued to find the format of presentation to be useful for deliberation and review of each candidate.

NEW MEMBER HARMINDER DUA SIGNING MEMBERSHIP BOOK

REPORT OF THE ARCHIVIST PHOTOGRAPHER

RALPH C. EAGLE, JR ,MD: I took nearly 1200 digital photographs at the One Hundred Fiftieth Annual Meeting of the American Ophthalmological Society held at the Ritz-Carlton at Battery Place, New York, New York on May 15-19, 2014. The photos were taken using a Nikon D800E digital camera. Nine photos were included as color illustrations in the 2014 on-line volume of the TRANSACTIONS OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY. These include photos of 2014 AOS President Hans E. Grossniklaus, MD, President Grossniklaus and his wife Daurice and a group photo of The Council. Also included were photos of 2014 Lucien Howe Medalist Morton F. Goldberg, MD, Dr. Goldberg and his wife Myrna, 2014 Verhoeff Lecturer Timothy Stout, MD and new member Judy E. Kim, MD signing the AOS Membership Book. An informal group photo of the new member luncheon and a formal group photo of the entire AOS membership in attendance near the shore at Battery Park with the Statue of Liberty in the background also were included. A digital copy of the group photo was distributed electronically to the membership after the meeting. I also prepared several copies of a large format Apple® photo book of the 2014 meeting. Copies were given to Drs. Grossniklaus and Liesegang and the AOS office.

Four photo shows comprising selected digital images in PDF format from the 2014 meeting can be downloaded from the meeting photos section of the *Members-Only* section of the AOS website. One includes photos of the officers and all the new members. Additional photo shows from the 1996 through 2013 meetings currently are online, as well as a number of historical photos from 1940's through the 1960's entitled "Images from the Past". I plan to upload addition photoshows in the future.

The digital archives of the AOS now comprise more than 9600 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 on CD and DVD's in some instances. A backup hard drive containing all the images will be stored in the AOS office in San Francisco.

I was invited to present an illustrated historical retrospective at the 2014 meeting. This was titled "A Few Observations on the Last Quarter Century of the American Ophthalmological Society: 1990-2014" Comprising more that 200 images, this light-hearted talk examined some of the changes that have occurred at AOS meetings during the past quarter century. The slides comprising this talk will be uploaded to the AOS website.

REPORT OF THE COMMITTEE ON EMERITI

Froncie Gutman, M.D.:Since our AOS Meeting in 2014, the following deaths have been reported to the Secretary. There have been five deaths since the last AOS Annual Meeting in 2014:

NAME	YEAR INDUCTED	RESIDENCE
William H. Annesley, Jr, MD	1980	Bryn Mawr, PA
Jose A. Berrocal, MD	1980	Santurce, PR
George O. Waring, III, MD, FACS, FRCOphth	1989	Atlanta, GA
Barbara W. Streeten, MD	1982	Syracuse, NY
Ronald M. Burde, MD	1983	Longboat Key, FL

May I ask for the membership to stand for a moment of silence to respect the memory of these friends and colleagues?

The following members have applied for Emeritus membership:

NAME	YEAR INDUCTED	QUALIFICATION
Norman P. Blair	2000	70+ years of age, member for 10+ years
Donald J. Doughman	1980	Member for 25+years
Robert N. Frank	1998	70+ years of age, member for 10+ years
Barbara E. K. Klein	1993	70+ years of age, member for 10+ years
Ronald Klein	1992	70+ years of age, member for 10+ years
Richard A. Lewis	1989	70+ years of age, member for 25+ years
Thomas J. Liesegang	1988	Member for 25+years
Richard L. Lindstrom	1990	Member for 25+years
Marilyn T. Miller	1991	70+ years of age, member for 10+ years
Alan Sugar	1989	70+ years of age, member for 25+ years
Charles P. Wilkinson	1981	70+years of age, member for 25+years

COUNCIL APPOINTMENTS FOR 2015-2016

AOS Council – Tim Olsen
AOS President – Marily Mets
Executive Vice President – Hans Grossniklaus
Editor – Emily Chew to continue
Member, Committee on Theses – Henry Jampel to join John Thompson, and Dimitri Azar
Member, Committee on Programs – Preston Blomquist to join J. Sebag, David Tse, and Eduardo Alfonso
Member, Committee on Membership – R. Michael Siatkowski to join Joel Schuman, William Mieler, and Mary Hartnett
Chair, Committee on New Members – Evelyn Paysse & David Coats to continue
Member, Committee on Prizes – Dan Jones to join Lee Jampol, and Hans Grossniklaus
Chair, Committee on Emeriti – Froncie Gutman to continue
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 – Ed Raab to continue; alternate George Spaeth to continue
Representative to the Pan American Association of Ophthalmology – Eduardo Alfonso to continue
Representatives to the American Orthoptic Council: Natalie Kerr, to join Edward Raab and James Reynolds
Representative to JCAHPO – William Mieler to continue
Parliamentarian – Edward Raab to continue

All were contacted and agreed to serve.

NEW MEMBER JANEY WIGGS SIGNING MEMBERSHIP BOOK

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

Marco Zarbin, MD, PhD:Narrow Networks in Medicare Advantage, Network Adequacy and Notification Legislation, Medi-Connect-Dual Eligibles Demo

Increasing numbers of Medicare beneficiaries are purchasing coverage via Medicare Advantage plans and through Affordable Care Act (ACA) exchanges. These insurer designed plans must at least provide the benefits offered by Medicare and have limited mechanisms to control costs. Cost control techniques being implemented now include narrow networks and quality designation programs. Problems regarding continuity of care and appropriate definitions of "quality" are anticipated. Eventually, coverage for ophthalmic surgical procedures may be affected. Initial experience from a Medicare-Medicaid demonstration project in California indicates that patients strongly prefer to retain their current physicians and that the notification process for alterations in care networks (with altered access to current physicians) is inefficient and can result in impaired patient outcomes. Regarding ACA exchanges, the majority of patients choose plans that have high deductibles in order to reduce monthly coverage costs. In many cases, it is unlikely that the patients will be able to afford the out of pocket expenses associated with the deductible. Finally, Congress's recent action regarding the sustainable growth rate (SGR) eliminated the plan to discard global periods, but it is possible that this issue will recur. This legislation does not eliminate penalties for meaningful use, Physician Quality Reporting System (PQRS), and value-based modifiers.

Electronic Health Records (EHR)

From general medicine, there is evidence that use of the EHR can improve quality of care, improve productivity, and thus reduce overall health care costs. However, a recent publication indicates that these goals are not necessarily achieved in all ophthalmology practices,[1] but they have been in others, particularly practices with multiple physicians and multiple practice locations. Some efficiencies include centralized scheduling, elimination of full-time equivalent (FTE) dedicated to finding lost charts, elimination of chart transfer to different locations, and improved collections at the time of registration. In many practices, scribes are used to enter data into the EHR. Scribes can also schedule the follow-up appointment in the exam room, which reduces check-out workload. The EHR also can convert International Disease Classification (ICD)-9 to ICD-10 diagnoses automatically and vice versa. Charge entry for clinic procedures is also done at the time of service. One can use Dragon to dictate impression and plan into the EHR. Pre-population of EHR fields can be a source of liability. Some fields are appropriately pre-populated (e.g., past surgical history), but some may not be (e.g., current medications). Failure to input variable data (e.g., chief complaint, vision, intraocular pressure, slit lamp exam, fundus exam) completely or accurately is an important source of liability as well as impaired patient care (particularly if the patient is followed by more than one physician in a given practice). The penalty for failure to prescribe electronically (ERx) is 1% this year and will increase in subsequent years. Certified Ophthalmic Assistants and Certified Ophthalmic Technicians are allowed to enter medication, radiology, and laboratory tests for purposes of meaningful use once they are certified scribes. Patient portals are now

being implemented. These give patients the opportunity to view their health records. Secure electronic messaging is to be used for communication with patients regarding relevant health information and is being implemented as a mandated activity (5% threshold). There is an American Academy of Ophthalmology/American Academy of Ophthalmic Executives (AAO/AAOE) Ophthalmology Meaningful Use Attestation Guide on line. Regarding IRIS™ Registry, ophthalmologists own their own data but give permission for their data to be forwarded anonymously to Centers for Medicare and Medicaid Services (CMS). The registry is important for decision making regarding population health. Eighty-percent of ophthalmologists using EHRs participate with Intelligent Research in Sight (IRIS™) and use it for quality reporting. Data are extracted from EHRs at night. One can compare one's data to that of others in the group, others in the state, and other ophthalmologists in the country. Given the ongoing penalties regarding meaningful use, PQRS, and value-based modifiers (totaling ~9% reimbursement eventually), IRIS™ has economic value as well as clinical value (e.g., change practice pattern if outcomes are substandard).

Payor Contracts

There is a movement from fee for service (FFS) to alternative models, but FFS is not going to be eliminated. Even with SGR fix, there may be a reduction in payment rate that is compensated by subsequent additional reimbursement from CMS. One must be sure to follow this issue carefully. There is a trend for forming clinically integrated networks (accountable care organizations (ACOs), megagroups), which tend to take on risk component to reimbursement. Payors are narrowing their provider networks (e.g., United Healthcare). New plan models are being developed (e.g., tiered plans, high deductible plans). *Know the payor perspective*: medical loss ratio, star rating system, pay for performance and value, share financial risk, know how payer differentiates itself in the market. One must know these data *before* meeting with payors. One should also *know one's practice*: payor mix, referral sources, FFS (standard vs. enhanced rates), risk tolerance, your market (including exclusivity arrangements of which specialists should be wary), whether you are willing to go out of network. One must track and police contracts once engaged. Develop a rate/payor spread sheet (procedure codes and modifiers, number units/year, reimbursement rates), know the quality and utilization measures being applied to your practice and monitor it (ask plan for this information, compare one's practice to other registries (e.g., Medicare 2012 data)). Risk sharing: transfer of financial risk (not same as insurance risk), types of risk arrangements (per case rate, withholds, capitation, bundled payments/episodes of care, percentage of premium, pay for performance and value), must understand cost and financial structure (ask payor to run the proposed contract using previous 2 year's worth of data to develop an impact projection). Risk sharing: withhold vs. capitation (commercial products, Medicare and Medicare Advantage), monitoring (comparative templates, EHR, data sources (plan vs. practice), scheduling and practice management, analysis of financial model (upon contract execution, month to month, upon renewal). Other issues: what is basis of payor fee schedule; how are unlisted codes paid; how are changes in rates handled; are you required to accept all products; termination provisions and post-termination state laws (including payment rates during post-termination periods of care); provisions affecting rates (utilization and quality measures, risk terms); provisions affecting your contract terms (policy and procedure manuals-READ IT!, provisions to include new physicians associated with organic growth of practice).

Rewarding Quality and Efficiency

As more and more patients have to bear the burden of paying health care costs directly (due to increasing magnitude of deductible), they are increasingly likely to make physician selection based on value. These data will be readily available through EHR-type sources. Thus, if cost is substantially higher than average for a given physician and complication rate is substantially lower than average, then there may be a market for that physician. If cost is substantially lower than average for a physician and complication rate is average or less than average, then there is likely to be a big market for that physician's services. Physicians can help define the market by defining various measures of quality that address more subtle aspects of practice beyond price and complication rate.

RUC Commission

Procedures that are done concurrently more than 50% of the time are likely to be bundled with corresponding reduction in reimbursement.

1. Singh RP, Bedi R, Li A, et al. The Practice Impact of Electronic Health Record System Implementation Within a Large Multispecialty Ophthalmic Practice. *JAMA Ophthalmol.* 2015.

REPORT OF THE REPRESENTATIVE TO THE AMERICAN COLLEGE OF SURGEONS

Edward L. Raab, MD, JD: Our Society's representative Dr. Edward L. Raab serves on the ACS Board of Governors and its Ophthalmic Advisory Council. These meet in conjunction with the ACS annual Clinical Congress and by teleconference. 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.

The College has reorganized the committee structure of the Board of Governors. The Board's committees are grouped under 5 major headings or "pillars": Member Services, Education, Advocacy and Health Policy, Quality Research and Patient Care, and Communication. Dr. Raab serves on the Patient Education Committee of the Education Pillar. In addition, he is a member of the Ophthalmic Surgery Advisory Council, which provides input to the ACS Board of Regents on matters concerning Ophthalmologist members of the College. Dr. Raab also participated as liaison to the Program Committee and has been in charge of submission of a panel session entitled "Eyelid and Orbital Masses and Deformities: Diagnosis and Management" with an invited co-sponsorship by the

Otolaryngology-Head and Neck Surgery Advisory Council, for the 2016 Annual Meeting. It is possible that the Plastic and Maxillofacial Surgery, the Neurological Surgery, and/or the Pediatric Surgery Advisory Councils will contribute to this effort. Historically, it has been difficult for Ophthalmology to develop topics of wide membership appeal.

Another impetus has been more frequent updating of Governors with material to be shared with their constituents, and an effort to achieve increased racial, gender, and ethnic diversity of Board members. There are informational webinars and the circulation of weekly "NewsScopes" discussing various current issues.

Advocacy is another College initiative. 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 is prominent in the College's advocacy efforts.

The concerns over the training of surgeons continue to occupy the College's efforts. Its surveys have shown that many graduating surgery residents do not feel that they are well prepared for practice. The decline in number of cases during residency, due in part to pre-emption for the training of post-residency fellows, and to the decrease in opportunities for progressive assumption of responsibility for decision making, are important factors in this result. It is not clear to what extent this sentiment has been voiced by ophthalmology residents as the ophthalmologist constituency in the ACS is small and relatively inactive.

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.

REPORT OF THE REPRESENTATIVES TO THE AMERICAN ORTHOPTIC COUNCIL

Edward L. Raab, MD: The American Orthoptic Council [AOC] establishes requirements for and accredits orthoptic teaching programs; examines candidates for certification; determines standards for continuing education of certified orthoptists; and promotes and oversees the knowledgeable and ethical practice of orthoptics. The Council consists of ophthalmologists specializing in pediatric ophthalmology and strabismus, and of certified orthoptists. Our Society's representatives to the Council during the past year have been Drs. Edward Raab, James Reynolds, and David Weakley. All are Past Presidents of the Council.

During the past year, Dr. Raab served as Chair of the Bylaws and International Affairs Committees and as a member of the Ethics Committee. Dr. Reynolds, served as Chair of the Editorial Committee and a member of the accreditation Committee. Dr. Weakley served on the Executive Committee as Immediate Past President; as Chair of the Nominating Committee; and member of the Accreditation, International Affairs, Editorial, and Long Range Planning Committees. Dr. Weakley has now retired from the Council after fifteen years of outstanding service, which was acknowledged by the Council at its 2014 Annual Meeting. Dr. Natalie Kerr has replaced Dr. Weakley as representative from AOS to AOC. She is the Immediate Past President of the Council and as such serves on the Executive Committee. She is also the Chair of the Accreditation and Nominating Committee and serving as co-moderator of both the AAO/AOC/AACSunday Symposium and the AAPOS/AOC Workshop for 2015. All three representatives from AOS serve as examiners on the oral portion of the American Orthoptic Council Orthoptist Certifying exams and will examine 13 candidates in October.

The Council has revised its structure and this past year consisted of three ophthalmologists representing the American Ophthalmological Society, three ophthalmologists and three orthoptists representing the American Association for Pediatric Ophthalmology and Strabismus; three ophthalmologists representing the American Academy of Ophthalmology; two ophthalmologists and one orthoptist representing the Section of Ophthalmology of the American Academy of Pediatrics; seven certified orthoptists representing the American Association of Certified Orthoptists; one ophthalmologist representing the Canadian Orthoptic Council and one Canadian certified orthoptist representing the Canadian Orthoptic Society.

There are thirteen AOC accredited Orthoptic Programs. In addition, there are short and long rotations and clinical partnering arrangements which expand Council's capability to afford a qualifying experience to interested candidates associated with the program at St. Catherine University Bachelor of Science in Orthoptics Program in Minneapolis, MN.

The Council's Annual Meeting and Certifying examinations were held in Houston in September, 2014. Thirteen candidates were certified. The 2015 examinations of 13 expected candidates will be conducted again in Houston in October.Candidates must initially pass a prior written examination, now given in electronic format. Two complete tests have been psychometrically validated. 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.

The Board of Directors of the American Orthoptic Journal, Inc. has been expanded to include representation from the Council and the American Association of Certified Orthoptists. The new Board is exploring the future direction of the Journal, and has been charged with reviewing and possibly reducing publishing costs and increasing circulation. The commitment to scholarship remains firmly in place. The recently achieved Medline recognition is an important enhancement to the worth of this excellent peer-reviewed publication. It will celebrate the 75th anniversary of the American Association of Certified Orthoptists with an expanded issue in 2015.

The Council is facing several challenges. It is not an officially acknowledged credentialing body and 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, the possibility of 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.

Members of the Council and the American Association of Certified Orthoptists continue to be active in national and international professional meetings. The AOC and AACO join each year with the American Academy of Ophthalmology to present the traditional Sunday Symposium at the AAO Annual meeting, and offer a workshop at the annual meeting of the American Association for

Pediatric Ophthalmology and Strabismus. The 2014 Symposium, "Adult Strabismus: Techniques Shared by Orthoptists and Strabismologists to Relieve Visual Discomfort" was co-moderated by AOS representative Dr. Natalie Kerr. The AAPOS workshop was "Twisted World of Ocular Torsion", also co-moderated by Dr. Kerr. Both were well received by very interested audiences. Council member Kyle Arnoldi, CO chairs the program of the 2016 meeting of the International Orthoptic Association in Rotterdam.

Further action items for the Council continued to be addressed during the past year:

- Changes to financial reporting to better track allocation of income and expenses;
- Further realignment of the Council to integrate its increased membership and our sponsoring organizations;
- Refinements in the content and conducting of the certifying examinations;
- Further development of a Policy and Procedure handbook to supplement the overall provisions of the bylaws.

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: Background Two years ago the AOS was invited to sponsor a symposium at the 2014 ICO meeting in Japan. While there were some criticisms by the symposium organizers and a few from the speakers, the AOS Council still decided it was an appropriate project and accepted the invitation to organize another symposium for the WOC2016 in Guadalajara, Mexico on February 5-8, 2016. The 2014 AOS symposium consisted of presentations covering a wide variety of ophthalmic subjects but the Council suggested the upcoming symposium be targeted to a narrower pediatric ophthalmologic subject. After discussion with Dr. Edward Wilson the theme of retinoblastoma was chosen. Speakers representing expertise in various aspects of retinoblastoma were invited to participate. The final symposium is attached.

I am pleased with the proposed talks which I believe showcase the many areas of expertise of members of the AOS.

Update on Retinoblastoma

Topic No:113

Type:Invited Symposium

Submitter:*Jason Yam. MPH. FRCS(Edin)*

Coordinator(s):*Marilyn Miller. M.D.;Edward Wilson, M.O.*

Chair(s):*Edward Wilson. M.D.Marilyn Miller. M.D.Emma Villasenor Fierro. M. 0* .

Description:

Retinoblastoma is the most common primary intraocular malignancy of childhood. In recent years, there has been remarkable progress in the understanding and targeted treatment of this important childhood cancer. In this symposium, international experts will summarize new developments that have improved survival, preserved vision, and even prevented second cancers. They will also discuss the challenges of providing access to care to those in developing nations

Learner Outcome:

- Describe the major advances in understanding and treatment of retinoblastoma that have occurred in the last 50 years.
- List the treatment options for retinoblastoma that have evidence-based validity and describe when they are each best utilized.
- Describe the genetic counseling principles that are utilized when giving advice to families with heritable retinoblastoma.
- Describe the pathology findings characteristic of retinoblastoma, its subtypes, and the common simulating lesions.

Categories: Pediatric Ophthalmology and Strabismus

Societies: American Ophthalmological Society (AOS)

Speaker Topics

Historic View of Retinoblastoma. *Hans Grossniklaus. MD.MBA,* Atlanta, United States

Update on Retinoblastoma Pathology. *Ralph Eagle Jr .. MD,* Philadelphia, United States

Advanced Retinoblastoma: IAC vs. Enucleation - A Point *I* Counterpoint. *Carol Shields. MD,* Philadelphia, United States

Advanced Retinoblastoma: IAC vs. Enucleation - A Point *I* Counterpoint. *Matthew Wilson. MD,* Houston, United States

Retinoblastoma in Mexico. *Juan Carlos Juarez Echenique. MD,* Mexico City , Mexico

Genetic Counselling-An Overview. *Elias Traboulsi. MO, Med,* Cleveland, United States

Retinoblastoma Genetics 2016. *Irene Maumenee. MD,* Chicago, United States

Submitted By

Name: Dr Jason Yam, MPH, FRCS(Edin)

Institution/University: Department of Ophthalmology and Visual Sciences, The Chinese University of

Hong Kong, 4/F Hong Kong Eye Hospital, Argyle Street, Hong Kong

REPORT OF THE REPRESENTATIVE TO THE PAN AMERICAN ASSOCIATION OF OPHTHALMOLOGY
Eduardo Alfonso, MD:

1. ***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. In 2013 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.
2. ***Fellowships Committee***.
   Paulo Augusto Arruda de Mello MD (Brazil) chairs the ***Fellowships Committee***. Scholarships are funded from a variety of sources. Over $150,000 in scholarships and other awards were given out in 2014 and pledged for 2015. 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 &Julianne Pyott Foundation.
3. ***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.

4. ***2015 Meetings & Educational Activities***
   Ana Luisa Hofling, MD, the first woman ophthalmologist from Latin America to be President of the Pan-American, declared education to be the highest priority for the organization.
   - **12th Leadership Development Course "Curso de Liderazgo"**
     Jointly with the American Academy of Ophthalmology (AAO)
     January 15-18, 2015
     San Francisco, California

   - **12th Pan-American Research Day (one day before the ARVO meeting)**
     May 2, 2015
     Denver, Colorado
   - **2nd Summit of the Americas**
     August 4, 2015
     Bogotá, Colombia

   - **31st Pan-American Congress of Ophthalmology**
     August 5-8, 2015
     Bogotá, Colombia

   - **29 th Mejor de la AAO en Español**
     November 18, 2015
     Las Vegas, Nevada
5. **Major Initiatives for the Year**
   Expand PAAO educational courses to virtually all countries in the Western Hemisphere.
   Expand the PAAO's online educational programs.
   Endorse guest speakers at national meetings, resident exchange, newsletter features; consultant visits, shared executive expertise and shared advocacy experience.

REPORT OF THE REPRESENTATIVE TO THE JCAPO

William F. Mieler, MD: The mission of the Joint Commission on Allied Health Personnel in Ophthalmology (JCAHPO) 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. JCAHPO has a membership of 21 ophthalmology and allied health organization, and has 36 representatives who are JCAHPO Commissioners. The most recent addition was AAPOS, who just joined JCAHPO in November 2015.

I was recently elected to JCAHPO's Board of Directors as a Director-At-Large. I primarily serve on the Education Committee(s), though have also been appointed to several other organizational committees and task forces

JCAHPO continues to have ongoing, active initiatives in certification, education, E-learning, international relationships, career

development, and in communication. This past year, JCAHPO had its largest number of people achieving certification in the three core certifications, COA, COT, and COMT. An Ophthalmic Scribe Certification program was also established this year, with its wide participation largely due to the new CMS rule requiring licensed or certified staff for CPOE Order Entry. In 2016, JCAHPO will offer several new certification initiatives.

With virtually every national ophthalmology meeting, there is an accompanying JCAHPO program. This past year, at the JCAHPO meeting at the AAO in Las Vegas, there were more than 2400 attendees. In addition, JCAHPO holds approximately 15 regional CE programs, conducts three monthly webinars, and offers over 300 online courses on its www.eyecarece.org website, JCAHPO's e-learning website.

There continues to be a strong international interest in JCAHPO's certification programs and education, and JCAHPO participates in presentations at the World Ophthalmology Congress as well. JCAHPO has endorsed WHO's definition of Allied Ophthalmic Personnel (AOP) to include ophthalmic assistants, technicians, and medical technologists, and will be communicating with the Commission regarding this definition.

Many ophthalmologists have indicated difficulty in recruiting new ophthalmic assistants. JCAHPO is working on a program to increase public awareness of the ophthalmic assisting profession designed to recruit and train new allied ophthalmic personnel. JCAHPO will be asking its Commission membership (AOS) to participate with them in the important workforce development initiative.

The involvement of the AOS with JCAHPO continues to promote a positive relationship between the two organizations. I recommend that the AOS and its members continue to actively support and endorse JCAHPO's certification and continuing education programs.

SCIENTIFIC SESSION, SATURDAY, MAY 17, 2015

6. 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*♦
7. 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***
8. 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 ***
9. The Cecocentral Scotoma: A Neuro-Ophthalmic Update. **Steven A. Newman***
10. Use Of The American Board Of Ophthalmologys Maintenance Of Certification Program To Meet Regulatory And Quality Requirements. **David Wilson*♦**, **Michael Siatkowski*♦**, **John Clarkson***
11. Defective Epithelial Basement Membrane Regeneration, Myofibroblasts, And Scarring In The Cornea After PRK In Rabbits. **Steven E. Wilson*♦**

SATURDAY EVENING BANQUET, MAY 17, 2015

REPORT FROM THE COMMITTEE FOR NEW MEMBERS

Evelyn A. Paysse, MD & David K. Coats, MD:The New Members Committee welcomed 13 new members at the 151st annual meeting of the American Ophthalmological Society. The new members are Massimo Busin, M.D., John D. Cameron, M.D., Clement K. Chan, MD, FACS, Raymond Douglas, M.D., Harminder S Dua, MBBS, DO, Tamara Fountain, M.D., Jost Jonas, MD, Gregg T. Kokame, M.D., MMM, Baruch D. Kuppermann, M.D. Ph. D., David Sarraf, M.D., Donald Tan, M.D., Stephen Tsang, MD Ph.D., and Janey Wiggs, MD, PhD

A brief background summary for each new member follows:

- **Massimo Busin, MD**
  - Professor of Ophthalmology and Head of the Ophthalmology Unit at "Village" Private Hospital in Forli, Italy
  - Cornea
  - Thesis: A two-piece microkeratome-assisted mushroom keratoplasty improves the outcomes and survival of grafts performed in eyes with diseased stroma and healthy endothelium
- **John D. Cameron, MD**
  - Professor of Ophthalmology and Visual Neurosciences and Laboratory Medicine and Pathology, University of Minnesota, School of Medicine
  - Ocular Pathology
  - Thesis Title: An 80-year experience with optic nerve glioma cases at the Armed Forces Institute of Pathology: evolution from museum to molecular evaluation suggests possible interventions in cellular senescence and microglial pathways."

- **Clement K. Chan, MD, FACS**
  - Associate Clinical Professor, Loma Linda University
  - Founder, President and Medical Director – Southern California Desert Retina Consulting | Inland Retina Consultants, Palm Desert, California
  - Retina
  - Thesis Title: Optical coherence tomographic and visual results at six months after transitioning to aflibercept for patients on prior ranibizumab or bevacizumab treatment for exudative age related macular degeneration
- **Raymond Douglas, MD**
  - Professor of Ophthalmology and Visual Sciences - Director of Thyroid Eye Disease Center, University of Michigan Kellogg Eye Center, Ann Arbor, MI
  - Oculoplastics
  - Thesis Title: Thyrotropin Receptor and Cd40 Mediate Interleukin- 8 Expression in Fibrocytes: Implications for Thyroid Associated Ophthalmopathy

- **Harminder S Dua, MBBS, DO, FRCS (Edinburgh)**
  - Chair and Professor of Ophthalmology and Head of Ophthalmology, Chairman Clinical Council for Eye Health Commissioning, England, Queens Medical Centre, University of Nottingham, Nottingham, England. United Kingdom.
  - Thesis: In Vitro Studies on the Antimicrobial Peptide Human Beta-Defensin 9 (Hbd9): Signaling Pathways and Pathogen-Related Response.
- **Tamara Fountain, MD**
  - Professor, Department of Ophthalmology, Rush University Medical Center.
  - Oculoplastics
  - Thesis: Ophthalmic Malpractice and Physician Gender: A Claims Data Analysis
- **Jost Jonas, MD**
  - Professor and Chairman, Department of Ophthalmology, Medical Faculty Mannheim of the Ruprecht-Karls-University Heidelberg, Germany
  - Thesis: Biomorphometry of the Optic Nerve
- **Gregg T. Kokame, MD, MMM**
  - Clinical Professor, University of Hawaii School of Medicine
  - Medical Director, Hawaii Macula and Retina Institute
  - Retina
  - Thesis: Prospect Evaluation of Subretinal Vessel Location in Polypoidal Choroidal Vasculopathy and Response of Hemorrhagic and Exudative High Dose Antiangiogenic Therapy
- **Baruch D. Kuppermann, M.D. Ph. D**
  - Professor and Chief, Retina Service, Gavin Herbert Eye Institute-University of California, Irvine-Department of Ophthalmology Interim Chair of Academic Ophthalmology
  - Retina
  - Thesis: Steroid differentiation: the safety profile of various steroids on retinal cells in vitro and their implications for clinical use
- **David Sarraf, MD**
  - Clinical Professor of Ophthalmology, Retinal Disorders and Ophthalmic Genetics Division; Jules Stein Eye Institute, UCLA
  - Retina
  - Thesis: Retinal Pigment Epithelial Tears in the Era of Intravitreal Pharmacotherapy: Risk Factors, Pathogenesis, Prognosis and Treatment
- **Donald Tan, M.D.**
  - Arthur Lim Professor of Ophthalmology, Duke-National University of Singapore
  - Cornea
  - Thesis title: Development of Selective Lamellar Keratoplasty within an Asian Corneal Transplant Program – The Singapore Corneal Transplant Study
- **Stephen Tsang, MD PhD**
  - Associate Professor, Ophthalmology and Pathology & Cell Biology
    Institute of Human Nutrition, Columbia University Medical Center
  - Retina
  - Thesis: Silencing of Turbin Enhances Photoreceptor Survival and Function in Preclinical Model of Retinitis Pigmentosa

- **Janey Wiggs, MD, PhD**
  - Associate Chief, Ophthalmology Clinical Research, Associate Director, Howe Laboratory, Massachusetts Eye and Ear Infirmary
  - Glaucoma
  - Thesis: Carrier Frequency of CYP1B1 Mutations in the United States

REPORT FROM THE ATHLETIC COMMITTEE:

Frederick Fraunfelder, MD: Newport Rhode Island was a great venue for golf, tennis, sailing and singing of songs by the different subspecialties. Golf winners included Peter Netland, Bob Sergott, Paul Tornambe, Vinod Lakhampal and Paul Mitchell for the men. Woody Van Meter had the longest drive and Mark Kleinman was closest to the pin. Dorene Shipley won the women's low gross and Mirian Ridley Ferris had the low net. In tennis, Fraunfelder and Sarraf edged out Tsai and Gottsch on the mens side while Budenz and Laties beat Raab and Pantin in womens match play. Natalie Kerr led the pediatric team in singing as organized by Susan Day. It was clear the pediatric ophthalmologists were the most creative and talented on that special night. Finally, sailing saw a competition between teams with green or yellow bandanas. No one is sure who won, but sailing real America's Cup Yachts was reward unto itself.

May 19-22 will find the membership at the 5 star Broadmoor hotel and resort. There are many hiking tours and wilderness events available. AOS will again sponsor tennis and golf with the added event of fishing. Amazingly, fishing has a well-recognized trophy associated with it and this was last awarded 5 years ago. Colorado Springs also has shopping, Pikes Peak, white water rafting, art galleries, and 300 days of sunshine a year. Look forward to visiting and making new friends through athletics in the coming year

REPORT FROM THE COMMITTEE ON PRIZES

CHAIR: GEORGE BRIAN BARTLEY, M.D.: The history of the Howe Medal has been elegantly recorded by Frank Newell, in his 1989 account of the AOS's first 125 years; by Dan Albert in his presentation about the medal to the Society in 2008, which is included in the wonderful sesquicentennial book that we received a year ago in New York; and by Jim Ravin and Alexandra Stern in their scholarly paper in 2010 about Lucien Howe.

In brief, Lucien Howe was born 167 years ago in Maine. His schooling included terms at Bowdoin College, Harvard, and Bellevue, from which he received his medical degree in 1872. Dr. Howe then toured various medical institutions in Europe, including time with Lister in Scotland and Helmholtz in Germany, before establishing a busy practice in Buffalo, New York. He made several notable contributions to medicine, for instance, championing Credé prophylaxis to treat ophthalmia neonatorum and authoring an extensive work on the muscles of the eye. Dr. Howe served as the President of the AOS in 1919 and provided funds three years later to establish an award that has come to bear his name. The first recipient was Carl Koller, whom Howe thought had not been appropriately recognized for his seminal use of topical anesthesia almost 40 years previously.

The original criteria for selecting the honoree included the following: "In appreciation of discoveries so notable as to advance suddenly the progress of ophthalmology in all parts of the world" or "in recognition of less brilliant but still conspicuous service as a writer or teacher, during long years of devotion to our science" or "to encourage investigation among younger ophthalmologists." Dr. Newell pointed out that few discoveries since Koller qualify for the first criterion, and that the medal has never been awarded for the third criterion, leaving "less brilliant but still conspicuous service" as the default measure of qualification.

The criteria currently used by the Committee on Prizes retains the option for a most brilliant innovation, but relies more on identifying an individual who has made outstanding original investigations, and/or significant contributions as an educator, and/or who has demonstrated meritorious and remarkable service.

The selection process was clarified and codified in 2013 by John Clarkson as Chair of the Committee on Prizes, Marilyn Miller and myself as committee members, and Tom Liesegang as the Society's Executive Director. This year, Lee Jampol, Hans Grossniklaus, and I served as the selection committee. We started the process by noting that any ophthalmologist is eligible to be honored, not just members of the AOS. We independently reviewed the Society's roster and invited nominations from the membership through the September newsletter. Voting cycles were conducted anonymously and tallied by the Society's administrator, Amber Mendez, to arrive at a short list of five tremendously qualified finalists. Curriculum vitae for these persons were discretely obtained and carefully reviewed. Further votes were taken to identify a first choice and an alternate, if needed. This year's Howe Medalist is richly deserving.

The 2015 awardee was born in 1942 in Grove City, Pennsylvania, where his father owned a furniture store. The third of six children, our honoree is described by his siblings as demonstrating leadership skills and a desire for service at an early age. Additionally, his family members state that the future Howe Medalist has always been self-deprecating and modest about his accomplishments.

After his undergraduate schooling at Princeton, our honoree headed back south to the University of Miami School of Medicine, then returned north for an internship in Boston. He spent time prior to his residency at Bascom Palmer with future Howe Medalist Don Gass and then pursued post-residency fellowships in pathology and retina at the Wilmer Institute before returning to Bascom Palmer as Chief Resident.

As a staff member, our future Howe Medalist was a quadruple threat, excelling as a practitioner, as a researcher with several NIH

grants and multiple publications covering a wide range of topics, as an educator, and as a skilled administrator. He was appointed department chair at Bascom Palmer in 1991 but was soon drawn into institutional leadership roles, culminating in his ascension to the position of Senior Vice President for Medical Affairs and Dean of the University of Miami School of Medicine in 1995.

After a decade of distinguished service that benefited all of medicine, our honoree returned to his specialty roots and accepted the position of Executive Director of the American Board of Ophthalmology, succeeding another future Howe Medalist, Denis O'Day.

Our awardee has had a most distinguished career, excelling in all aspects of professional life. His contributions have touched thousands of lives: medical students, residents, fellows, faculty and staff, ABO diplomates, national medical leaders, and of course his patients. The ripple effect of his work is almost incalculable. And our specialty has benefited both directly and indirectly from his service. His personal life has been no less full and rewarding, with a marriage that has blossomed over more than 50 years and now crowned by five handsome grandchildren. John Gordon Clarkson is a worthy recipient of the AOS Howe Medal.

2015 LUCIEN HOWE MEDALIST JOHN GORDON CLARKSON, MD

SCIENTIFIC SESSION, SUNDAY, MAY 17, 2015

12. The Power Of Sample Size In Understanding Flap Striae As A Risk Factor Of Low Incidence In Refractive Surgery. **Ronald R. Krueger*♦**, Minoru Tomita♦
13. 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
14. Partial Muscle Recession For Small-Angle Vertical Strabismus. **Steven M. Archer***, Catherine S. Choi, Jasleen K. Singh
15. Transformation Of Benign Choroidal Nevi To Malignant Melanomas: Authoritative Pronouncements Versus Scientific Evidence. **James J. Augsburger ***, Zelia M. Correa
16. 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*♦**
17. Comparison Of DALK Vs PK Outcomes For Keratoconus, Stromal Dystrophies And HSV Keratitis. **Donald Tan♦**, Marcus Ang, Anshu Arundhati
18. Aflibercept, Bevacizumab, Or Ranibizumab For Diabetic Macular Edema. **Lee M. Jampol**

Members registered for the 2015 meeting. 8 professional guests are at the end of the list

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Adelman	Ron	Active Member
Allingham	R. Rand	Active Member
Anderson Jr.	W. Banks	Emeritus Member
Archer	Steven	Active Member
Arnold	Anthony	Active Member
Asbell	Penny	Active Member
Augsburger	James	Active Member
Azar	Dimitri	Active Member
Bartley	George	Active Member
Bateman	J. Bronwyn	Active Member
Baum	Jules	Emeritus Member
Biglan	Albert	Emeritus Member
Blomquist	Preston	Active Member
Bobrow	James	Active Member
Buckley	Edward	Active Member
Budenz	Donald	Active Member
Bullock	John	Emeritus Member
Cameron	Douglas	Active Member
Cantor	Louis	Active Member
Caprioli	Joseph	Active Member
Chan	Clement	Active Member
Chen	Teresa	Active Member
Chew	Emily	Active Member
Chiang	Michael	Active Member
Chodosh	James	Active Member
Cibis	Gerhard	Emeritus Member
Clarkson	John	Active Member
Coleman	Anne	Active Member
Coleman	D. Jackson	Emeritus Member
Dana	Reza	Active Member
Davis	Janet	Active Member
Day	Susan	Active Member
Donahue	Sean	Active Member
Douglas	Raymond	Active Member
Dua	Harminder	Active Member
Eagle Jr.	Ralph	Active Member
Elman	Michael	Active Member
Elner	Susan	Active Member
Elner	Victor	Active Member
Erie	Jay	Active Member
Feman	Stephen	Emeritus Member
Ferris	Frederick	Active Member
Flach	Allan	Active Member
Flaxel	Christina	Active Member
France	Thomas	Emeritus Member
Fraunfelder	Frederick	Active Member
Friedman	Alan	Active Member
Gottsch	John	Active Member
Grand	M. Gilbert	Active Member
Grossniklaus	Hans	Active Member
Gutman	Froncie	Emeritus Member
Guyton	David	Emeritus Member
Haller	Julia	Active Member
Hartnett	Mary	Active Member
Holland	Gary	Active Member
Huang	David	Active Member
Jaeger	Edward	Emeritus Member
Jampel	Henry	Active Member
Jampol	Lee	Emeritus Member
Johnson	Mark	Active Member
Jonas	Jost	Active Member
Kerr	Natalie	Active Member
Kinyoun	James	Active Member
Kokame	Gregg	Active Member
Krueger	Ronald	Active Member
Kuppermann	Baruch	Active Member
Laibson	Peter	Emeritus Member
Lakhanpal	Vinod	Active Member
Laties	Alan	Emeritus Member
Lemp	Michael	Active Member
Lichter	Paul	Emeritus Member
Liesegang	Thomas	Emeritus Member
Ludwig	Irene	Active Member
Mazow	Malcolm	Emeritus Member
Merriam	John	Active Member
Mets	Marilyn	Active Member
Mieler	William	Active Member
Mills	Richard	Active Member
Mitchell	Paul	Active Member
Morrison	John	Active Member
Newman	Steven	Active Member
Nork	T. Michael	Active Member
Olsen	Timothy	Active Member
O'Neill	John	Active Member
Packer	Samuel	Active Member
Parrish, II	Richard	Active Member
Parver	Leonard	Active Member
Pasquale	Louis	Active Member
Paysse	Evelyn	Active Member
Pollack	Irvin	Emeritus Member
Raab	Edward	Active Member
Reynolds	James	Active Member
Ritch	Robert	Active Member
Robin	Alan	Active Member
Rogers	Gary	Active Member
Runge	Paul	Active Member
Sarraf	David	Active Member
Schubert	Hermann	Active Member
Schwab	Ivan	Active Member
Sebag	J	Active Member
Sergott	Robert	Active Member
Sherwood	Mark	Active Member

Sommer	Alfred	Active Member
Spaeth	George	Active Member
Spivey	Bruce	Emeritus Member
Stamper	Robert	Active Member
Stein	Joshua	Active Member
Tan	Donald	Active Member
Thompson	John	Active Member
Tornambe	Paul	Active Member
Tsai	James	Active Member
Tsang	Stephen	Active Member
Tse	David	Active Member
Tychsen	Lawrence	Active Member
Van Meter	Woodford	Active Member
Weakley Jr.	David	Active Member
Wiggs	Janey	Active Member
Wilensky	Jacob	Active Member
Wilkinson	Charles	Emeritus Member
Wilson	David	Active Member
Wilson	M. Roy	Active Member
Wilson	Steven	Active Member
Wilson Jr.	M. Edward	Active Member
Wood	Thomas	Emeritus Member
Yannuzzi	Lawrence	Active Member
Young	Terri	Active Member
Zarbin	Marco	Active Member

Professional Guests

Albuquerque	Romulo	Professional Guest
Bernstein	Audrey	Professional Guest
Iannaccone	Allessandro	Professional Guest
Schechet	Schechet	Professional Guest
Seddon	Joanna	Professional Guest
Tan	James	Professional Guest
Thiessen	Craig	Professional Guest
Wang	Sophia	Professional Guest

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

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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

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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

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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

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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

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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.

THE ROLE OF LYMPHATIC VESSELS IN CORNEAL ALLOGRAFT REJECTION

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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?

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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

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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

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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

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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)

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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

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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)

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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

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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

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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

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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.

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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

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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.