The American Ophthalmological Society

ONE HUNDRED AND FORTY-NINTH ANNUAL MEETING

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MAY 16–19, 2013
THE LODGE AT TORREY PINES
LA JOLLA, CALIFORNIA

The American Ophthalmological Society

Office of the Executive Vice President
Jacksonville, Florida
May 2013

THE ONE HUNDRED AND FORTY-NINTH ANNUAL MEETING
of the Society will be held at

The Lodge at Torrey Pines
La Jolla, California
Thursday through Sunday
May 16–19, 2013

COMMITTEE ON PROGRAMS CHAIR
Stephen D. McLeod

TARGET AUDIENCE

Ophthalmologists involved in academic practice, private practice, training programs, research, or administrative health care.

MEETING OBJECTIVES

The objectives of the 2013 Annual Meeting are to:

1. Discuss important new advances in the prevention, cause, diagnosis, and treatment of eye diseases.
2. Identify basic and clinical vision research that can be transformed into improved clinical care.
3. Assess the role of new technologies in the evaluation and treatment of eye diseases.
4. Describe factors that impact the effective delivery of the highest quality eye care for the public.
5. Identify clinical, scientific, and ethical issues confronting the profession.

FDA STATUS DISCLAIMER

Some material on recent developments may include information on drug or device applications that are not considered community standard, that reflect indications not included in approved FDA labeling, or that are approved for use only in restricted research settings. This information is provided as education only so physicians may be aware of alternative methods of the practice of medicine, and should not be considered endorsement, promotion, or in any way encouragement to use such applications. The FDA has stated that it is the responsibility of the physician to determine the FDA status of each drug or device he or she wishes to use in clinical practice, and to use these products with appropriate patient consent and in compliance with applicable laws.

The Society provides the opportunity for material to be presented for educational purposes only. The material represents the approach, ideas, statement, or opinion of the presenter and/or author(s), not necessarily the only or best methods or procedure in every case, nor the position of the Society. The material is not intended to replace a physician's own judgment or give specific advice for case management. The Society specifically disclaims any and all liability for injury or other damages of any kind for any and all claims that may arise out of the use of any technique demonstrated or described in any material by any presenter and/or author(s), whether such claims are asserted by a physician or any other person.

FINANCIAL DISCLOSURE

The financial disclosures of the presenters, authors, primary discussants, Council, and members of the Committee on Programs are listed on pages VII-IX in the program book. Conflicts, if noted, were managed prior to the presenter being included in the program. If the presenter has a financial disclosure related to the specific presentation, the disclosure will be stated verbally and presented on the first slide of their presentation. Audience participants are required to state their financial disclosure before they join a discussion of a paper or poster.

REGISTRATION

Members and guests should check in at the AOS registration desk on the first day of the meeting to receive meeting information. Those who have not pre-registered and paid their registration fees or dues may do so at this time. Registration will be available at the following times:

THURSDAY, MAY 16: 1:30 PM–5:00 PM

FRIDAY, MAY 17: 6:30 AM–12:00 PM

SATURDAY, MAY 18: 6:00 AM–12:00 PM

SUNDAY, MAY 19: 6:30 AM–10:00 AM

ACCREDITATION STATEMENT

This activity has been planned and implemented in accordance with the Essential Areas and policies of the Accreditation Council for Continuing Medical Education through the joint sponsorship of the American Academy of Ophthalmology and the American Ophthalmological Society. The American Academy of Ophthalmology is accredited by the ACCME to provide continuing medical education for physicians.

CREDIT DESIGNATION STATEMENT

The American Academy of Ophthalmology designates this live activity for a maximum of 10.75 *AMA PRA Category 1 Credits*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

BYLAWS

The following Bylaws are published each year in the program as a reminder to the members of the Society.

ARTICLE VI, Section 3—Any member who shall be absent from regular meetings for three consecutive years without valid excuse shall be dropped from the roll, except for honorary members, emeritus members, members of twenty years standing, or those then serving in the Armed Forces. An excuse for absence is valid only when a member is ill or when there is illness of a member of his immediate family.

~Thomas J. Liesegang, Executive Vice President

MEMBERS ELECTED AT THE LAST MEETING

Christophe Baudouin	Paris, France
Janet L. Davis	Miami, FL
Bita Esmaeli	Houston, TX
Judy E. Kim	Milwaukee, WI
Shigeru Kinoshita	Kyoto, Japan
Ronald R. Krueger	Cleveland, OH
Gregg T. Lueder	Saint Louis, MO

IN MEMORIAM

The Executive Vice President has received notice of the deaths of the following members during the past year:

Melvin G. Alper	Bethesda, MD	Joined 1975
Leonard Apt	Los Angeles, CA	Joined 1980
Morton C. Cox, Jr.	Pinckney, MI	Joined 1980
William G. Everett	Ponte Vedra, FL	Joined 1966
William C. Frayer	Bryn Mawr, PA	Joined 1966
Thomas R. Hedges, Jr.	Moorestown, NJ	Joined 1963
Robert E. Kennedy	Pittsford, NY	Joined 1964
Denis M. O'Day	Nashville, TN	Joined 1990
Stephen J. Ryan, Jr.	Los Angeles, CA	Joined 1979
Lorenz E. Zimmerman	Washington, DC	Joined 1985

FUTURE ANNUAL MEETINGS

2014 AOS ANNUAL MEETING
The Ritz-Carlton New York, Battery Park
New York, New York
May 15–18, 2014

FINANCIAL DISCLOSURES

The following are the healthcare-related financial disclosures of those involved in the preparation or presentation of this AOS event. The AOS Committee on Programs gathered this information to plan the program and has attempted to manage relevant financial disclosures to present a balanced program. The presenter will indicate on the first slide and verbally at the beginning of the talk, if any of the financial disclosures listed has a relationship to the specific presentation. Participants that might speak from the floor are requested to state their financial disclosures before they speak.

Category	Code	Description
Consultant/ Advisor	C	Consultant fee, paid advisory boards or fees for attending a meeting (for the past 1 year)
Employee	E	Employed by a commercial entity
Lecture Fees	L	Lecture fees (honoraria), travel fees or reimbursements when speaking at the invitation of a commercial entity (for the past 1 year)
Equity Owner	O	Equity ownership/stock options of publicly or privately traded firms (excluding mutual funds) with manufacturers of commercial ophthalmic products or commercial ophthalmic services
Patents/Royalty	P	Patents and/or royalties that might be viewed as creating a potential conflict of interest
Grant Support	S	Grant support for the past 1 year (all sources) and all sources used for this project if this form is an update for a specific talk or manuscript with no time limitation

ABBOTT, Richard L.
C – Santen
O – Elmedtech

BAUDOUIN, Christophe
C – Alcon, Allergan, MSD, Santen, Thea
L – Alcon, Allergan, MSD, Santen, Thea
S – Alcon, Allergan, MSD, Santen, Thea

BRIGNOLE–BAUDOUIN, Francoise
C – Thea Laboratories

BRODSKY, Michael C.
S – Research to Prevent Blindness, Inc.

CANTOR, Louis B.
C – Allergan, AMO, Mati, Liquidia, Sucampo
L – Allergan
O – Mati
S – Alcon

CASTANO, Eliana
S – Merck

CHEN, John J.
S – National Institutes of Health

CHIANG, Michael
C – Clarity Medical Systems
S – National Institutes of Health

CHULAY, Jeffrey D.
E – Applied Genetic Technologies Corp.
O – Applied Genetic Technologies Corp.
S – FDA Office of Orphan Product Development

COHEN, Elisabeth J.
S – Merck

COLEMAN, Anne L.
S – AHRQ, NEI

DAVIS, Janet
C – Xoma Inc., American Board of Ophthalmology
E – University of Miami Miller School of Medicine
S – Santen Inc.

DE MORAES, Carlos Gustavo
C – Aeon Astron, Inc.
L – Allergan, Inc.

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C – QLT

GARDNER, Thomas W.
C – Kalvista, Akebia, Aerpio

HARTNETT, Mary Elizabeth
C – Genentech
S – Axikin Pharmaceuticals, Reeves Foundation, National Eye Institute

KAUSHAL, Shalesh
P – University of Florida

KRUEGER, Ronald R.
C – LensAR Laser Systems, Alcon Labs, Clarity Medical Systems, Presbia
O – LensAR Laser Systems, Calhoun Vision
S – Alcon Labs

LAUER, Andreas K.
S – Oxford Biomedica, Acucela, National Institutes of Health – National Eye Institute

LIEBMANN, Jeffrey M.
C – Allergan, Inc., Diopysis, Inc., Quark Pharmaceuticals, Inc., Merz, In., SOLX, Inc.
S – National Eye Institute/National Institutes of Health, New York Glaucoma Research Institute, Allergan, Inc., Alcon, Inc., Topcon, Inc., Reichert, Inc., Carl Zeiss Meditec, Inc.

MANDELCORN, Efrem D.
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L – Novartis

MIELER, William F.
C – Genentech, Alcon, Allergan

MILLER, Joel M.
E – Smith–Kettlewell Eye Research Institute
O – Eidactics
S – NIH/NEI

MULLINS, Robert F.
S – Alcon Research, Ltd.

MUSCH, David C.
C – AqueSys, Glaukos, InnFocus, Ivantis
S – National Eye Institute

NEWMAN–CASEY, Paula Anne
S – Heed Ophthalmic Foundation, Blue Cross Blue Shield of Michigan, Menakka and Essel Bailey Graduate Fellowship

NIZIOL, Leslie M.
S – NEI/NIH, Research to Prevent Blindness

PALLANCH, John F.
L – Acclarent, Brainlab

PALMBERG, Paul F.
C – Aurolab (Aravind Eye Hospital, Madurai), AqueSys, Inc., Innovia–In Focus, LLC, Aeon Astron Europe
S – Abbott Medical Optics

PARRISH II, Richard K.
C – Alimera Sciences, Inc., Bausch + Lomb, Glaukos Corp., AqueSys, Inc., InnFocus, Inc. Merck & Co., Inc., Aerie Pharmaceuticals, Inc., Abbvie, Inc., Valeant Pharmaceuticals International, Inc.
O – Glaukos Corp., AqueSys, Inc., InnFocus, Inc., Innolene LLC, Vitalspring Technologies, Inc., Aerie Pharmaceuticals, Inc.

PENNESI, Mark E.
S – Pfizer

RITCH, Robert
C – Sensimed, iSonic Medical, Aeon Astron
L – Aeon Astron
P – Ocular Instruments Inc.

ROBIN, Alan L.
C – Merck, Alcon, Glaukos, Aerie Pharmaceuticals, Aravind Eye Foundation
L – Merck, Alcon

SADUN, Alfredo A.
C – Pfizer
S – Edison

SCOTT, Alan B.
P – Alan B. Scott
S – National Institutes of Health

SEBAG, J.
C – ThromboGenics
L – ThromboGenics
O – ThromboGenics

SOMMER, Alfred
O – Becton Dickinson, T. Rowe Price

SPAETH, George
L – Merck, Alcon, Allergan
S – Merck, Alcon, Allergan

STEINERT, Roger F.
C – OptiMedica, Abbott Medical Optics, ReVision Optics, WaveTec
P – Rhein Medical

STOUT, J. Timothy
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P – Oxford Biomedica
S – AGTC Inc., Oxford Biomedica, Pfizer Inc.

STROUSTRUP, Annemarie
S – National Institutes of Health

TERRY, Mark
L – Alcon
P – Bausch and Lomb Surgical
S – Bausch and Lomb Surgical, Fischer Surgical Ophthalmics

TU, Elmer Y.
C – Bausch & Lomb

UY, Harvey S.
L – Allergan, Beaver Visitec International, Novartis
S – LensAR Laser Systems, Alcon

WALSH, Thomas
C – Astellas, Pfizer, Trius, iCo
S – Astellas, Merck, Pfizer, Trius, Novartis

WELEBER, Richard G.
C – Pfizer, AGTC, Wellstat
P – VFMA
S – Oxford Biomedica, Foundation Fighting Blindness

WILKINSON, Charles P.
C – FDA

WILSON, David J.
S – AGTC, Oxford BioMedica, Foundation Fighting Blindness, Research to Prevent Blindness, NEI

WILSON, M. Edward
P – Springer Books

NO FINANCIAL RELATIONSHIPS TO DISCLOSE:

ABLUKH, Tanya
ANFINSON, Kristin R.
ARAVIND, Haripriya
BALAKRISHNAN, Vijayakumar
BARTLEY, George B.
BRADLEY, Elizabeth A.
BRODIE, Scott E.
BUCKLEY, Edward
CHAN, Candy K.
CHARLSON, Mary
CHEW, Emily Y.
CHOW, Clement C.
DANH, Kenneth K.
DAY, Susan H.
DENOYER, Alexandre
DIENG, Adji B.
DIKOPF, Mark S.
ELKIN, Zachary P.
ERIE, Jay C.
FLACH, Allan J.
FLOTTE, Terence R.
GAO, Guangping
GARRITY, James A.
GILLESPIE, Brenda W.
GINSBURG, Robin N.
GOLDBERG, Judith D.
GOOD, William V.
GOTTSCH, John D.
GROSSNIKLAUS, Hans E.
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HECKENLIVELY, John R.
HILLIER, Sian
HOLZMAN, Ian R.
HUANG, Laura C.
HUMPHRIES, Margaret R.
ING, Malcolm R.
JENSEN, Lauren J.
JIANG, Yanchao
JUNG, Jesse J.
KAALBERG, Emily E.
KAFRI, Tal
KEENAN, Jeremy D.
KERR, Natalie C.
KLINGER, Kyle N.
LAKHANPAL, Rohit R.
LAKHANPAL, Vinod
LEI, Lei
LI, Huapeng
LI, Xiaochun
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MOSS, Stephen
NEWMAN, Steven
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PILLAI, Manju Ramakrishna
RAAB, Edward L.
RAVILLA, Sathya
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SCHUBERT, Hermann
SHAH, Milan
SHIELDS, Carol L.
SMALL, Kent W.
SMITH, Wesley Clay
STONE, Edwin M.
SUNDSTROM, Jeffrey M.
TAYLOR, Hugh R.
THULASIRAJ, Ravilla D.
TORNAMBE, Paul E.
TUCKER, Budd A.
TZEKOV, Radouil T.
WA, Christianne A.
WANG, Haibo
WELLS, Martin
WEST, Sheila K.
WILSON, Beth
WOOG, John J.
WRIGHT, Kenneth W.
YANG, Zhihong
YEE, Kenneth M. P.

DID NOT DISCLOSE FINANCIAL RELATIONSHIPS:

SHERWOOD, Mark

American Ophthalmological Society Annual Meeting

Event Schedule

THURSDAY, MAY 16

12:00 PM – 1:30 PM	New Member Luncheon (by invitation)	Charles Fries
1:30 PM – 5:00 PM	Registration	Maurice Braun Foyer
2:00 PM – 3:30 PM	New Member Spotlight Presentations	Charles Reiffel
6:00 PM – 7:30 PM	Reception for New Members (black tie optional)	Arroyo Terrace

FRIDAY, MAY 17

6:30 AM – 12:00 PM	Registration	Maurice Braun Foyer
6:30 AM – 8:00 AM	Continental Breakfast	Charles Reiffel
7:30 AM – 9:30 AM	AOS-Knapp Symposium	Maurice Braun Ballroom
7:30 AM – 9:30 AM	Spouse/Personal Guest Hospitality Lounge	Charles Fries
9:30 AM – 10:00 AM	*Coffee Break*	Charles Reiffel
10:00 AM – 12:00 PM	Scientific Program (5 Presentations)	Maurice Braun Ballroom
1:00 PM – 4:30 PM	Mixed Doubles Tennis Tournament	Hilton La Jolla Tennis Courts
12:30 PM – 5:00 PM	Men's Golf Tournament	Torrey Pines Golf Course
12:30 PM – 5:00 PM	Women's Golf Tournament	Torrey Pines Golf Course
3:30 PM – 5:00 PM	Council Chair Chat	Everett Jackson 1
6:00 PM – 7:30 PM	Reception (casual)	Alfred Mitchell

American Ophthalmological Society
Annual Meeting

Event Schedule

SATURDAY, MAY 18

6:00 AM – 12:00 PM	Registration	Maurice Braun Foyer
6:00 AM – 8:00 AM	Continental Breakfast	Charles Reiffel
6:30 AM – 7:15 AM	Executive Session (members only)	Maurice Braun Ballroom
7:15 AM – 8:15 AM	Scientific Program (4 Presentations)	Maurice Braun Ballroom
7:30 AM – 9:30 AM	Spouse/Personal Guest Hospitality Lounge	Charles Fries
8:15 AM – 9:45 AM	Symposium: The Patient or the Public - Whose Interests do we First Serve?	Maurice Braun Ballroom
9:45 AM – 10:40 AM	Coffee Break and Poster Session	Charles Reiffel
10:40 AM – 12:00 PM	Scientific Program (3 Presentations)	Maurice Braun Ballroom
12:00 PM – 1:30 PM	Emeritus Luncheon (by invitation)	Charles Fries
1:00 PM – 4:30 PM	Men's & Women's Tennis Tournaments	Hilton La Jolla Tennis Courts
6:30 PM – 7:30 PM	Reception	Maurice Braun Foyer
7:30 PM – 10:30 PM	Banquet (black tie optional)	Maurice Braun Ballroom

SUNDAY, MAY 19

6:30 AM – 10:00 AM	Registration	Maurice Braun Foyer
6:30 AM – 8:00 AM	Continental Breakfast	Charles Reiffel
7:30 AM – 10:00 AM	Scientific Program (6 Presentations)	Maurice Braun Ballroom

Scientific Program

SYMPOSIUM AGENDAS AND PAPER ABSTRACTS

The following abstracts of papers selected to be presented at the meeting have been printed as received. The order of presentation has been arranged as follows by the Committee on Programs. Scientific sessions will be held in the Maurice Braun Ballroom.

Papers not read at one session will be called for in order at the opening of the following session. Papers presented at this meeting may be published in OTHER medical journals after this meeting PROVIDED THE AUTHORS ADHERE TO THE STRICT GUIDELINES IN THE AUTHOR INSTRUCTIONS AS LISTED AT aosonline.org AND CONSULT WITH THE EDITOR OF THE TRANSACTIONS.

Papers are limited to 10 minutes and the first discussant to 3 minutes. Secondary discussants are limited to 1 minute and the final reply by the original author is limited to 3 minutes.

PLEASE NOTE THE FOLLOWING PROGRAM KEY

Bold = AOS Member
* = Presenter
♦ = Financial Disclosure

(Presenters will indicate their financial disclosure verbally and in the first slide.)

Knapp Symposium

CHALLENGES OF OPHTHALMIC CARE IN THE DEVELOPING WORLD CME

Friday, May 17, 2013

Introduction

Stephen D. McLeod
University of California, San Francisco, School of Medicine
San Francisco, CA

Verhoeff Lecture

Preventing Blindness & Child Mortality with Vitamin A: an AOS Odyssey

Alfred Sommer♦
Johns Hopkins University School of Medicine
Baltimore, MD

Overview of Major Challenges & the Vision 20/20 Initiative

Hugh R. Taylor
University of Melbourne
Melbourne, Australia

Trachoma Prevention & Treatment

Sheila West
Johns Hopkins University School of Medicine
Baltimore, MD

Corneal Blindness & Infectious Keratitis

Thomas M. Lietman
University of California, San Francisco, School of Medicine
San Francisco, CA

CMV Retinitis

Jeremy Keenan
University of California, San Francisco, School of Medicine
San Francisco, CA

A Systems Approach to Cataract Blindness

Ravilla D. Thulasiraj
Lions Aravind Institute of Community Ophthalmology
Madurai, India

Retinopathy of Prematurity in the Developing World

Michael Chiang♦
Oregon Health & Science University
Portland, OR

Discussion

1. TREATMENT OF LCA2 PATIENTS WITH AN AAV2 VECTOR EXPRESSING HRPE65 CME

Tim Stout*♦, Richard Weleber♦, Maureen McBride, **David Wilson♦**, Mark E. Pennesi♦, Margaret Humphries, Terry Flotte, **Shalesh Kaushal♦**, Lauren Jensen, Andreas Lauer♦, Jeff Chulay♦

Purpose: To evaluate the safety and efficacy of rAAV2-CB-hRPE65 in patients with Leber congenital amaurosis caused by mutations in the RPE65 gene.

Methods: Twelve LCA2 patients were treated with a single, unilateral, subretinal dose of an AAV2 vector harboring the human RPE65 gene. Doses ranged from 1.8 x 1011 to 5.4 x 1011 viral genomes and were delivered in 450 µL. Serial postoperative examinations included measurements of acuity, static and kinetic perimetry, optical coherence tomography, fundus photography, luminance sensitivity and visual quality-of-life function.

Results: All subjects tolerated the surgery and study agent without surgical or inflammatory complications. Visual acuities were transiently depressed in the treated eye of all patients during the first 1 to 2 weeks after surgery, but returned to baseline or better in all of but two patients. Post-treatment improvement in visual acuity was observed in the four youngest patients with increases ranging from 6 to 12.5 ETDRS letters. For the three subjects with visual acuity of 20 to 31 ETDRS letters, one had a 2.5 letter increase and two had a 6.5 or 12 letter decrease in the treated eye. GATE total and central 30 degree hill-of-vision analysis trended towards improvement when compared to baseline values. The five subjects with the poorest baseline visual acuity had little or no change in their visual acuity over time, but for the four subjects followed for at least 6 months, three had a small but statistically significant increase in kinetic perimetry with the V4e target in the treated eye compared to baseline. An improvement in visual functioning and quality of life was noted by most patients.

Conclusions: Gene therapy for LCA2 patients with a recombinant AAV2-hRPE65 vector is safe and appears effective. The greatest improvements in visual acuity were observed in younger patients who presented with better baseline visual acuity.

Discussant: **Edwin M. Stone**

2. VITRECTOMY FOR FLOATERS: PROSPECTIVE EFFICACY ANALYSIS AND RETROSPECTIVE SAFETY PROFILE CME

J. Sebag[*♦], Kenneth M. P. Yee, Laura C. Huang, Christianne Wa, **Alfredo A. Sadun**[♦]

Purpose: Floaters can impact vision, but the mechanism is unknown. It is hypothesized that floaters reduce contrast sensitivity (CSF) and that CSF can be normalized by vitrectomy. It is further hypothesized that not inducing PVD during surgery will lower the incidence of retinal tears (reported at 30%) and cataract formation (reported from 53-76%), which may also be mitigated by leaving anterior vitreous behind the lens.

Methods: 69 eyes (40 phakic) in 54 patients (age = 61 +/- 13.6 years) with floaters were compared to 42 eyes in 26 controls. The main etiologies for floaters were PVD (46/69; 67.6%), myopic vitreopathy (22/69; 31.8%), and asteroid hyalosis (8/69; 11.6%). Minimally-invasive 25G vitrectomy was performed without induction of PVD, leaving anterior vitreous intact, and inserting a non-hollow probe for superior cannula extraction. Follow-up averaged 15.5 months (range: 3-51). Vision status/satisfaction was quantified prospectively in 17 patients using the NEI Visual Function Questionnaire (VFQ-39). CSF was prospectively evaluated with Freiburg Acuity Contrast Testing (Weber index: %W) in 13 eyes of 10 floater patients (52.9 +/- 21.6 years) and compared to age-matched controls (N=32 in 16 patients; 52.6 +/- 14.6 years). The reproducibility of FrACT was found to be 92.1% (n=10 eyes).

Results: Eyes with floaters had 52% attenuation in CSF (4.37 +/- 2.54 %W) compared to controls (2.87 +/- 1.19 %W; $P < 0.008$). Following vitrectomy, CSF normalized in each case at 1 week (2.21 +/- 1.64 %W; $P < 0.014$) and remained normal at 1 month (2.16 +/- 1.29 %W; $P < 0.016$) and 3 months (2.28 +/- 1.58 %W; $P<0.015$). VFQ improved for the composite of all 39 questions (19.5%; P=0.004) as well as for general vision (37.5%; P =0.003), near vision (22.5%; P= 0.012) and driving (21.4%; P=0.012) at 1 month, and was sustained at 3 – 9 months post-op.

No patients (0/69; 0%) developed retinal breaks or detachments, hemorrhage, infection, or glaucoma. Only 8/40 (20%) phakic eyes developed cataracts requiring surgery, which occurred only in patients aged 53 to 66 years, an average of 16.1 months post-vitrectomy.

Conclusions: Floaters impact vision by lowering CSF, which in part explains patient unhappiness. CSF is normalized within 1 week after vitrectomy and remains normal at each post-op evaluation. Not inducing PVD reduced retinal tear incidence from 30% to 0% ($P < 0.007$). This and preserving vitreous behind the lens lowered the incidence of post-vitrectomy cataract surgery from 50% to 20% ($P < 0.02$) compared to previous studies. Minimally-invasive vitrectomy thus appears effective and safe in alleviating the visual dysfunction induced by floaters.

Discussant: **Charles P. Wilkinson**[♦]

3. EVALUATION OF THE REACTIVE T CELL INFILTRATE IN UVEITIS AND INTRAOCULAR LYMPHOMA WITH FLOW CYTOMETRY OF VITREOUS FLUID (AN AOS THESIS) CME

Janet L. Davis*♦, Philip Ruiz, Jr., Milan Shah, Efrem D. Mandelcorn♦

Purpose: To describe the reactive T cell infiltrate in uveitis and intraocular lymphoma using flow cytometry of clinical intraocular specimens acquired during diagnostic pars plana vitrectomy.

Methods: Design: Retrospective review of diagnostic vitreous specimens between 1992 and 2011. Setting: University-based, tertiary care. Patients: 78 patients with uveitis or lymphoma undergoing pars plana vitrectomy and selected for intraocular testing based on clinical diagnostic uncertainty. Interventions: Pars plana vitrectomy with flow cytometry, gene rearrangement studies, and cytology.

Results: T cell infiltrates were found in all diagnostic categories with limited power to discriminate between uveitis and T lymphocyte reactive infiltrates in response to intraocular lymphoma. Statistically significant differences by two sample test of means between group means were found between 35 uveitis and 35 B cell lymphoma cases for T cell markers CD2, 3, 4, 5, and 7, but not for CD8. The CD4:CD8 ratio had a higher mean value in the uveitis group (P=.0113) and 8 T cell lymphomas had a statistically greater number of CD3+ lymphocytes compared to uveitis (P=.0199) by two-sample test of means. Likelihood ratios were highest for CD2, CD5, CD7, CD4:CD8 ratio, CD20, and CD22.

Conclusions: Discrimination between uveitis and lymphoma based on cell identification by flow cytometry was limited due to the prevalence of T lymphocytes in all diagnostic categories, emphasizing the importance of a reactive T cell infiltrate in B cell lymphomas which may impede diagnosis. Flow cytometry may allow identification of more cases of T cell lymphoma than reported when it is combined with gene rearrangement and cytology.

Discussant: **Hans E. Grossniklaus**

4. MEAN NOCTURNAL ARTERIAL BLOOD PRESSURE IS STRONGLY ASSOCIATED WITH PROGRESSION OF NORMAL-TENSION GLAUCOMA CME

Carlos Gustavo De Moraes*♦, Alissa R. Link, Martin T. Wells, Adji Dieng, Jeffrey M. Liebmann♦, Mary E. Charlson, **Robert Ritch♦**

Purpose: Normal-tension glaucoma (NTG) patients may continue to have progressive visual field (VF) loss despite intraocular pressure (IOP) reduction. Low systemic blood pressure (BP) is a reported risk factor for glaucoma incidence and progression. However, most studies relied on single BP recordings and did not consider nocturnal BP in relation to daytime BP. We hypothesized that VF progression in NTG occurs at least in part due to systemic BP falling below the lower limit of autoregulation, resulting in ischemia and optic nerve injury, and that the extent and duration of the nocturnal fall in mean arterial pressure (MAP) below the autoregulatory limit may be associated with progression.

Methods: Patients diagnosed with NTG with reproducible VF defects were included. All patients had a history of IOP <21 mmHg prior to glaucoma treatment. Systemic and ocular characteristics were evaluated. BP was monitored every 30 minutes for 48 hours with an ambulatory recording device at 6-month intervals. All patients had a minimum of 8 VF tests and progression was defined based on the EMGT criteria and rates of mean deviation (MD) change (dB/yr).

Results: 166 eyes of 85 NTG patients were included (mean age, 65 years; 67% women). Multivariate analysis revealed that the total time that nocturnal MAP was below the daytime MAP was associated with VF progression (p=0.023). The total area under the curve (i.e.: both magnitude and duration of the BP below daytime MAP) was also significantly associated with progression (p=0.035). Use of topical beta-blockers (p=0.059) and IO (p=0.066) reached borderline significance. There was a significant difference in MD change between patients with and without hypertension in the total time (p=0.025) and the total area measure (p=0.024)

Conclusions: Nocturnal BP dips below the daytime mean MAP, as well as the magnitude and duration of these dips, are associated with progression of NTG. Patients with NTG should have 24-hour BP monitoring to assess their risk of progression.

Discussant: **Louis B. Cantor♦**

5. DESCEMET MEMBRANE ENDOTHELIAL KERATOPLASTY (DMEK) COMBINED WITH CATARACT SURGERY: COMPLICATIONS AND VISUAL RESULTS CME

Mark A. Terry*♦

Purpose: Pre-op pupil dilation with cycloplegics is contraindicated in Descemet Membrane Endothelial Keratoplasty (DMEK). We report our technique, complications and results with the DMEK Triple procedure. (Transplantation combined with phacoemulsification cataract extraction and intra-ocular lens placement).

Methods: DMEK was performed in 68 eyes, 37 combined with cataract surgery and 31 with DMEK alone. No cycloplegia drops were used in any case. Complications, donor endothelial cell loss, and visual results were compared.

Results: Re-bubble rates in the triple cases (30%) were almost equivalent with the DMEK alone cases (32%), (p=0.82). Primary graft failure (PGF) was lower in the triple cases (8%) than in the DMEK alone cases (19%), but the difference was not statistically significant (p=0.29). Mean endothelial cell loss measured at 6 months after surgery was 31% in both groups. Early visual results were not different between the two groups (mean = 20/24 and 20/25), with triple cases having 79% achieve > 20/25 and 38% achieve > 20/20; DMEK alone cases had 83% achieve > 20/25 and 25% achieve > 20/20. (p > .10 for all visual comparisons).

Conclusions: DMEK combined with cataract surgery with a technique that avoids cycloplegics has as low (or lower) a complication rate as performing DMEK alone and post-op visual results are comparable. When DMEK and cataract surgery are both required, they should be performed at the same time.

Discussant: **Frederick W. Fraunfelder♦**

6. ULTRASHORT-PULSE LASERS TREATING THE CRYSTALLINE LENS: WILL THEY CAUSE VISION-THREATENING CATARACT? (AOS THESIS 2012) CME

Ronald R. Krueger*♦, Harvey S. Uy♦, Jared P. McDonald

Purpose: To demonstrate that ultrashort-pulse laser treatment in the crystalline lens does not form a focal, progressive, or vision-threatening cataract.

Methods: An vanadate picosecond laser (10 ps) with prototype delivery system was used. Primates: 11 rhesus monkey eyes were prospectively treated at the University of Wisconsin (energy 25-45 microJoules/pulse and 2.0-11.3 Million pulses per lens). Analysis of lens clarity and fundus imaging was assessed postoperatively for up to 4.5 years (5 eyes). Humans: 80 presbyopic patients were prospectively treated in one eye at the Asian Eye Institute in the Philippines (energy 10 microJoules/pulse and 0.45-1.45 Million pulses per lens). Analysis of lens clarity, best-corrected visual acuity (BCVA), and subjective symptoms was performed at 1 month, prior to elective lens extraction.

Results: Bubbles were immediately seen, with resolution within the first 24 to 48 hours. Afterwards, the laser pattern could be seen with faint, noncoalescing, pinpoint micro-opacities in both primate and human eyes. In primates, long-term follow-up at 4.5 years showed no focal or progressive cataract, except in 2 eyes with preexisting cataract. In humans, <25% of patients with central sparing (0.75 and 1.0 mm radius) lost 2 or more lines of BSCVA at 1 month, and >70% reported acceptable or better distance vision and no or mild symptoms. Meanwhile, >70% without sparing (0 and 0.5 mm radius) lost 2 or more lines, and most reported poor or severe vision and symptoms.

Conclusions: When treating the crystalline lens with a picosecond laser, focal, progressive, and vision-threatening cataracts can be avoided by lowering the laser energy, avoiding prior cataract, and sparing the center of the lens. Future investigation with a femtosecond laser is recommended in further characterizing these effects.

Discussant: **Roger F. Steinert♦**

7. TARGETED SILENCING OF VEGF REDUCES ABERRANT INTRAVITREAL ANGIOGENESIS IN MODEL OF RETINOPATHY OF PREMATURITY CME

M. Elizabeth Hartnett*♦, Zhihong Yang, Haibo Wang, Tal Kafri, Yanchao Jiang, Manabu McCloskey

Purpose: Vascular endothelial growth factor (VEGF) inhibitors have improved outcomes in adult eye diseases with abnormal angiogenesis, but in retinopathy of prematurity (ROP) concerns exist about inhibiting VEGF. We tested the hypothesis that targeted silencing of VEGF in cells that overexpress it would reduce abnormal intravitreal angiogenesis in a relevant model of ROP.

Methods: All studies were approved by the University of Utah Institutional Animal Care and Use Committee. A well-accepted rat model of oxygen-induced retinopathy (OIR) causes conditions similar to human severe ROP: fluctuations in arterial oxygen concentrations, extrauterine growth restriction, and zone II, stage 3 ROP with plus disease. Retinal VEGF was measured by enzyme-linked immunosorbent assay (ELISA). VEGF mRNA expression was localized in retina using in situ hybridization. Short hairpin RNAs were fashioned as microRNAs with fluorescent (GFP) tags to silence VEGFA (shRNA-VEGF) or luciferase (shRNA-luc) and packaged into lentivectors with CD44 promoters designed to target Mueller cells (provided by J. Flnnery). Bilateral subretinal injections of shRNA-VEGF or shRNA-luc (1uL) were performed on postnatal day (p)8. GFP of transduced cells was visualized in vivo with the Micron fundus camera. Intravitreal angiogenesis (IVA) and percent avascular retina (AVA) were measured in lectin-stained retinal flat mounts in p18 pups.

Results: At p14, VEGF localized to retinal layers corresponding to glutamine synthetase-positive Mueller cells. At p18, VEGF was increased in the ROP model 3-fold compared to room air raised pups ($P<0.0001$). shRNA-VEGFA treatment restored retinal VEGF levels to room air levels. At p18, IVA was significantly decreased 4-fold in retinal flat mounts ($P= 0.0017$), whereas AVA was unaffected compared to control.

Conclusions: In a model of ROP, silencing of Mueller cell-overexpressed VEGFA reduced IVA and restored VEGF levels to room air levels without adversely affecting AVA at p18. Additional study to selectively target overexpressed VEGF may lead to future treatments of severe ROP.

Discussant: **Hans E. Grossniklaus**

8. BUPIVACAINE SHORTENS EYE MUSCLES AND CORRECTS STRABISMUS CME

Alan B. Scott[*♦], Joel M. Miller[♦], Kenneth K. Danh

Purpose: To evaluate clinical effectiveness and gross anatomic changes resulting from bupivacaine injection into extraocular muscles to treat comitant horizontal strabismus.

Methods: In a prospective pilot trial, 19 patients with esotropia 9-40 pd received injection of bupivacaine into the lateral rectus muscle, and 12 patients with exotropia 12-85 pd received injection into the medial rectus muscle. Sixteen of these 31 patients having large strabismus angles also received injection of botulinum toxin into the antagonist muscle at the same treatment session. A second treatment was given to 13 patients who had residual strabismus after the first.

Results: At 6 months after the last injection, bupivacaine-injected muscles increased in volume by 5.9%; their maximum cross-sectional area increased by 7.9%. At the latest examination, average 15 months after the last treatment, the original deviation was reduced by 1.4 pd or 50%, and 52% of patients had residual deviation of 10 pd or less. Two patients with diplopia from slight over-corrections required surgical alignment. No eye was perforated or lost vision. The maximum muscle enlargement in this series, 15%, is an amount calculated to move the eye about 1 degree. Changes of 10-15 degrees, as in some of our cases, require one or more additional mechanisms. We suppose that the sarcomeres are rebuilt to make a wider shorter muscle. Alteration of the fiber types and addition of fibrous tissue within the muscle to stiffen it are likely additional mechanisms of action of bupivacaine upon eye muscles.

Conclusions: Bupivacaine corrects strabismus by altering eye muscle structure and length. The effect persists month to years in many cases.

Discussant: **William V. Good**

9. PRESENTATION OF FUNGAL ENDOPHTHALMITIS OUTBREAK DUE TO CONTAMINATED TRIAMCINILONE FROM A COMPOUNDING PHARMACY CME

Kent W. Small*, Candy Chan, Thomas Walsh♦

Purpose: To provide data on the presentation of an outbreak of fungal endophthalmitis due to contaminated triamcinilone from a compound pharmacy.

Methods: A retrospective chart review was performed of 15 patients who received intravitreal injections of preservative-free triamcinolone obtained from Franck's pharmacy which were subsequently found to be contaminated with the fungus Bipolaris hawaiiensis. Seventeen eyes were injected (one twice) with this preservative-free triamcinilone . Two patients received bilateral sequential injections. The data extracted from the charts were: time to onset of signs and symptoms of infection, visual acuity, intraocular pressure, fundus photos, fluorescein angiography, ultrasounds, vitreous culture and biopsy results.

Results: Of the seventeen eyes injected, 12 (70%) eventually developed evidence of fungal endophthalmitis. The time of onset of signs and / or symptoms ranged from 2 weeks to 10 months, median 4 months. The typical presenting signs and symptoms were painless loss of vision in an eye which was white and quiet appearing except for cell in the anterior chamber and the vitreous. Vitreous biopsy (cytospin for hyphae) obtained by pars plana vitrectomy was more sensitive in making the diagnosis of fungal endophthalmitis than was vitreous culture or in office "vitreous taps" (including cyto-spin).

Conclusions: Fungal endophthalmitis is rare and can have an insidious and much delayed onset. Initially making the diagnosis without the context of a documented "outbreak" is extremely difficult. Endophthalmitis due to Bipolaris hawaiiensis, a plant mold, has only been reported twice before. Our Bipolaris endophthalmitis cases have many similarities with the Exserohilum meningitis cases. Both are ubiquitous airborne black molds which had contaminated triamcinilone by different compounding pharmacies. The markedly delayed onset of Bipolaris hawaiiensis infections is a potentially ominous warning for the patients and doctors involved with the 17,000 patients exposed to Exserohilum meningitis.

Discussant: **William F. Mieler♦**

Symposium

THE PATIENT OR THE PUBLIC: WHOSE INTERESTS DO WE FIRST SERVE? CME

Saturday, May 18, 2013

Introduction

Richard P. Mills
AOS Council Chair
Seattle, WA

Atlas Unshrugged: The Physician's Ethical Burden
Robert Ritch♦
New York Eye & Ear Infirmary
New York, NY

Bottom of the Ninth?
Susan H. Day
California Pacific Medical Center
San Francisco, CA

Discussion

10. AN EVALUATION OF NON-PHYSICIAN EDUCATORS' ROLE IN ENHANCING CATARACT PATIENT'S SURGICAL KNOWLEDGE AND SATISFACTION AT THE ARAVIND EYE HOSPITAL CME

Paula Anne Newman-Casey*♦, Sathya Ravilla, Vinoth Palanichamy, Manju Pillai, Vijayakumar Balakrishnan, Haripriya Aravind, **Alan Robin♦**

Purpose: To evaluate the efficacy of non-physician pre-surgical educators in teaching cataract patients and enhancing satisfaction with their medical care.

Methods: We prospectively administered a questionnaire at an Aravind Eye Hospital to 60 patients with visually significant cataracts both before and after they underwent pre-surgical counseling. Our primary outcomes included patient's cataract knowledge and changes in patient's decisional conflict (1) over whether to undergo surgery. We assessed socio-demographic characteristics including age, sex, occupation, literacy status, education, insurance status, and whether a patient was the primary decision maker. We evaluated each counselor's knowledge. After counseling, we measured patient satisfaction with the counseling services.

Results: Both the patient knowledge scores and decisional conflict scores improved following counseling (mean difference +2.0 questions out of 11, p=0.004 and +8.4, p<0.0001). Multiple regression identified female gender (Beta=2.5, p<0.001) and being illiterate (Beta=1.7, p=0.04), as important factors in how much the counseling increased patient knowledge. 99% of patients reported that they were satisfied with the counseling system. Counselor knowledge scores were correlated to patient satisfaction score (Pearson correlation coefficient 0.49, p<0.001). There was a significant correlation between the patient satisfaction score and the change in patient knowledge score (Pearson correlation coefficient 0.28, p=0.03). Undergoing surgery was associated with an increased satisfaction score (p=0.10).

Conclusions: Not all counseling programs have been as successful (2). The Aravind Eye Hospital has created a model program where non-physician educators are effectively counseling patients (3). Counseling improved knowledge and reduced anxiety about cataract surgery, potentially facilitating increased uptake. We found counseling to be important in reaching out to patients who have traditionally had more limited access to healthcare such as women and illiterate patients (4). Increased use of high quality counseling might help to further reduce the global burden of cataract blindness (5,6).

Discussant: **Richard L. Abbott♦**

11. PATIENT-SPECIFIC INDUCED PLURIPOTENT STEM CELLS (iPSCs) ALLOW DIRECT INVESTIGATION OF DISEASE MECHANISMS IN INHERITED RETINAL DEGENERATION CME

Budd A. Tucker, Robert F. Mullins♦, Kristin R. Anfinson, Emily E. Kaalberg, **Edwin M. Stone***

Purpose: Usher Syndrome is an inherited disorder characterized by early onset hearing loss and retinitis pigmentosa (RP). Mutations in USH2A are the most common cause of both Usher syndrome type II and non-syndromic autosomal recessive RP. The large size of the USH2A gene and its polymorphism in the general population make it challenging to distinguish true disease-causing mutations from benign polymorphisms - something that will be essential to do during the development and deployment of gene and cell based therapies. This study was performed to test the hypothesis that patient-derived iPSCs could be used to demonstrate the pathogenicity of a recently discovered intronic mutation.

Methods: iPSCs were generated via transduction of human keratinocytes, obtained from a patient with USH2A-associated RP, using the transcription factors Oct4, Sox2, C-Myc and KLF4. iPSC potency and capacity for retinal differentiation were demonstrated by immunocytochemistry, western blotting, and teratoma formation. Pathogenicity of the USH2A mutation was demonstrated with rt-PCR and western blotting of USH2A.

Results: iPSCs were generated from a patient with USH2A associated RP. Cell lines were expanded in feeder free conditions and determined to be pluripotent based on the expression of pluripotency markers and the ability to generate tissues specific to all three germ layers. Following differentiation, eyecups containing both RPE and neural retina developed in vitro. Isolation of the neural retina and subsequent analysis of the USH2A transcript revealed that a suspected splice site mutation within IVS40 caused exonification of the intron and insertion of a premature stop codon.

Conclusions: By combining next generation sequencing and induced pluripotent stem cell (iPSC) technologies we were able to clearly demonstrate the pathogenicity of an intronic mutation in a patient with non-syndromic USH2A associated RP. These findings will enable us to proceed with patient specific studies focused on USH2A gene correction and photoreceptor cell replacement.

Discussant: **John R. Heckenlively**

12. INCREASING USE OF THE VACCINE AGAINST ZOSTER ACCORDING TO CURRENT NATIONAL RECOMMENDATIONS CME

Elisabeth J. Cohen*♦, Zachary Elkin, Jesse Jung, Xiaochun Li, Judith D. Goldberg, Eliana Castano♦, Ilyse Haberman, Lisa Park, Michael Perskin

Purpose: To increase usage of the vaccine against herpes zoster at an academic medical center by 1) having ophthalmologists provide the vaccine at a city hospital and 2) studying general internal medicine physicians' knowledge, attitudes, practices, and barriers before, and one year after, interventions to facilitate use.

Methods: 1) An IRB approved prospective study of 100 eligible ophthalmology clinic patients who received the zoster vaccine compared to 66 eligible patients who declined the vaccine. 2) An IRB approved baseline and follow up survey of general internal medicine physicians regarding the vaccine against herpes zoster pre and post interventions including education, increased availability at the pharmacy, and electronic medical record reminders. Pharmacy use of vaccine was monitored.

Results: 1) 166 consenting patients included 100 vaccinated patients and 66 patients who declined. The most common reason that patients declined was they wanted to speak with their primary care physician (23/49, 46.9%). 2) Response rate was 33.5% (89/266) for the baseline survey and 29.1% (75/257) for the follow-up, including 55 doctors who responded to both. Only 66% (42/64) at baseline and 72.6% (46/62) on follow-up responded that HZ vaccination was an important clinical priority. Physicians' preferred intervention was nurse-initiated prompting about vaccination (36/75, 48% at baseline and 29/60, 48.3% on follow-up). On follow-up, more practices have supports for physician education about shingles (p=0.0034). Monthly pharmacy vaccine prescriptions increased from averaging 47 (range 33-59), prior to interventions, to 134 (range 103-169) afterwards (286% increase).

Conclusions: Addressing barriers to the zoster vaccine can increase its use. Physicians need to recommend this vaccine more strongly.

Discussant: **John D. Gottsch**

13. THE ROLE OF AUTOPHAGY IN THE CLEARANCE OF RPE LIPOFUSCIN CME

Shalesh Kaushal*♦, Lei Lei, Radouil Tzekov, Huapeng Li, J. Hugh McDowell, Guangping Gao, Wesley C. Smith

Purpose: To understand the possible role of lysosomes and autophagy in degrading RPE lipofuscin.

Methods: RPE cells were fed with either unbleached or 4-hydroxynonenal (HNE) -modified rod outer segments (ROS). The cells were then treated with several lysosome or proteasome inhibitors or with known enhancers and inhibitors of autophagy and the autofluorescence was detected by FACS. Immunofluorescence microscopy with LC3 antibodies was used to confirm the effect of autophagy inhibitors or enhancers. The intracellular localization of lipofuscin after treatment with chloroquine or ammonium chloride (NH_4Cl), both lysosomal inhibitors, was also evaluated by confocal microscopy. In a complementary approach, we monitored the levels of lipofuscin after downregulation of two autophagy proteins (ATG5 and ATG7) by either siRNA or shRNA. Finally, the autophagy inducer rapamycin was added to cells that have previously accumulated lipofuscin for live cell experiments.

Results: Cells supplemented with either HNE-modified ROS or unbleached ROS all increased lipofuscin-like autofluorescence (LLAF) at a similar rate at both wavelengths with the inhibition of lysosomes with NH_4Cl or chloroquine or inhibiting autophagy (with 3-MA), In contrast, induction of autophagy with four known inducers (rapamycin, Ku-0063794, PI-103, PIK-90) significantly decreased LLAF in cells that have previously accumulated lipofuscin. After incubating the cells with either rapamycin, Ku-0063794 or PI103, a conversion of LC3-1 to LC3-2 was observed-confirming that autophagy was stimulated. Inhibition of ATG5 and ATG7 was confirmed by Western blot and resulted in an increase in lipofuscin. Live cell imaging of lipofuscin laden RPE cells treated with rapamycin demonstrated a rapid and significant decrease in lipofuscin.

Conclusions: These results emphasize the role of autophagy in modulating RPE lipofuscin. Further, it confirms the possibility of pharmacological clearance of RPE lipofuscin by small molecules modulating the mTOR/autophagy pathway, thus opening new avenues for the treatment of dry ARMD and other lipofuscinopathies.

Discussant: **Tim Stout**♦

14. THE ASSOCIATION OF NEONATAL DACRYOCYSTOCELES AND INFANTILE DACRYOCYSTITIS WITH NASOLACRIMAL DUCT CYSTS CME

Gregg T. Lueder*

Purpose: To investigate whether neonatal dacryocystoceles and dacryocystitis are associated with nasolacrimal duct cysts, and to report the outcomes of treatment of these disorders.

Methods: This was a retrospective medical record review of two groups of infants with nasolacrimal duct (NLD) obstruction treated in a referral practice. The first group consisted of 33 neonates who had dacryocystoceles with or without dacryocystitis. The second group consisted of 27 infants less than 6 months of age without dacryocystoceles who had NLD obstruction with symptoms severe enough to require early NLD probing. All of the patients underwent NLD probing and nasal endoscopy. When present, NLD cysts were removed. Treatment was considered successful if the dacryocystoceles resolved and there were no clinical signs of recurrent lacrimal infection.

Results: In the first group of 33 neonates, acute dacryocystitis was present in 16 patients, 12 had noninfected dacryocystoceles that did not resolve, and 5 had dacryocystoceles that resolved but severe symptoms persisted. All of the patients had NLD cysts that were surgically removed. The symptoms resolved after surgery in 31 patients (94%). In the second group of 27 older infants with severe symptoms, 12 (44%) patients had NLD cysts. The symptoms resolved in 11 (92%) of 12 patients following NLD probing and cyst removal.

Conclusions: Neonatal dacryocystoceles are almost always associated with NLD cysts. NLD probing with endoscopic cyst removal is the most effective method of treating these patients. Nasolacrimal duct cysts also are present in many young infants with severe symptoms of NLD obstruction. Nasal endoscopy is an important adjunct to the management of these infants.

Discussant: **Edward L. Raab**

15. THE ROLE OF THYROID EYE DISEASE AND OTHER FACTORS IN THE OVERCORRECTION OF HYPOTROPIA FOLLOWING UNILATERAL ADJUSTABLE SUTURE RECESSION OF THE INFERIOR RECTUS CME

Natalie C. Kerr*

Purpose: Overcorrection of hypotropia subsequent to adjustable suture surgery following inferior rectus recession is undesirable, often resulting in persistent diplopia and reoperation. I hypothesized that overcorrection shift after suture adjustment may be unique to thyroid eye disease, and the use of a nonabsorbable suture may reduce the occurrence of overcorrection.

Methods: A retrospective chart review of adult patients who had undergone eye muscle surgery with an adjustable suture technique was performed. Overcorrection shifts that occurred between the time of suture adjustment and 2 months postoperatively were examined. Descriptive statistics, linear regression, Anderson-Darling tests, generalized Pareto distributions, odds ratios, and Fisher tests were performed for two overcorrection shift thresholds (>2 and >5 prism diopters [PD]).

Results: Seventy-seven patients were found: 34 had thyroid eye disease and inferior rectus recession, 30 had no thyroid eye disease and inferior rectus recession, and 13 patients had thyroid eye disease and medial rectus recession. Eighteen cases exceeded the 2 PD threshold, and 12 exceeded the 5 PD threshold. Statistical analyses indicated that overcorrection was associated with thyroid eye disease (P=6.7E-06), inferior rectus surgery (P=6.7E-06), and absorbable sutures (>2 PD: OR=3.7, 95% CI=0.4-35.0, P=0.19; and >5 PD: OR=6.0, 95% CI=1.1-33.5, P=0.041).

Conclusions: After unilateral muscle recession for hypotropia, overcorrection shifts are associated with thyroid eye disease, surgery of the inferior rectus, and use of absorbable sutures. Surgeons performing unilateral inferior rectus recession on adjustable suture in the setting of thyroid eye disease should consider using a nonabsorbable suture to reduce the incidence of postoperative overcorrection.

Discussant: **Steve A. Newman**

16. VISUAL FIELD IMPROVEMENT IN THE COLLABORATIVE INITIAL GLAUCOMA TREATMENT STUDY CME

George Spaeth[*♦], Paul Palmberg[♦], **Paul Lichter**, Brenda Gillespie, Leslie Niziol[♦], David Musch[♦]

Purpose: Evaluate whether occurrences of visual field improvement in the Collaborative Initial Glaucoma Treatment Study participants were real or due to random variation.

Methods: Baseline and follow-up VF tests (Humphrey 24-2 full threshold VFs) were obtained and mean deviation (MD) change from baseline over up to nine years of follow-up was analyzed. Baseline factors reported to be predictive of long-term VF loss in the CIGTS were inspected to determine the extent and direction of their association with VF improvement in repeated measures regression models.

Results: The percentage of CIGTS participants showing substantial VF improvement over time was similar to that showing VF loss through five years after initial treatment, after which VF loss became more frequent. At 1, 3, and 5 years after treatment, substantial VF loss/improvement was observed in 6.6%/7.5%, 10.9%/12.7%, and 14.5%/13.9%, respectively. At seven years, occurrences of substantial VF loss (19.6%) were more frequent than VF improvement (13.5%). Significantly predictive factors for VF improvement included female sex [odds ratio (OR)=1.73, 95% confidence interval (CI) = 1.17, 2.56], visit one year prior to cataract extraction (OR=0.11, 95% CI=0.02, 0.62), and an interaction between treatment and baseline MD in which participants treated with surgery who presented at baseline with more substantial VF loss were more likely to show VF improvement than those with comparable VF loss treated medically. Measures of intraocular pressure (IOP) control during treatment were also predictive of VF improvement, including a lower mean IOP, lower minimum IOP, and measures relating to maintenance of lower IOP during prior follow-up.

Conclusions: In CIGTS, comparable percentages of participants demonstrated either substantial VF loss or improvement through five years after treatment initiation, after which VF loss became more frequent. Predictive factors for VF improvement include some that are consonant with the postulate that VF improvement was real, such as measures of better IOP control over time.

Discussant: **Anne L. Coleman**[♦]

17. THE MONOFIXATION SYNDROME - DOES IT CHANGE WITH TIME? CME

Malcolm R. Ing*, Kathryn Roberts, Alexander Lin, John Chen♦

Purpose: The purpose for this study of consecutive patients in a private practice of pediatric ophthalmology was to determine the etiology, characteristics and stability of the monofixation syndrome (MFS).

Methods: The charts of 63 consecutive patients encountered in a 5 year period (2008-2012), with a minimum of 3 years follow-up with the diagnosis of MFS, were studied to determine the etiology, characteristics and stability of the syndrome. Best visual acuity, motor angle deviation at near, fusion, as measured by the Worth-4-dots and stereoacuity, as tested by Titmus vectograph overlay, on the last visit were examined. The stability of the MFS was documented by comparing the date of the first diagnosis of the patients and the date of the last exam for those who had not decompensated and comparison of the date of the decompensation and secondary surgery for those who did decompensate

Results: The etiology of the MFS was esotropia in 58 patients (92.0%), anisometropia in 2 patients (3.2%) and exotropia in 3 patients (4.4%). No decompensation of the MFS was found in those patients with refractive or exotropia etiology, but decompensation was found in a total of 6 patients with esotropia. Five of the decompensated patients were restored to MFS by secondary sugery and one experienced spontaneous recovery. Stable MFS patients were followed for 13.9 years and those that showed decompensation had been followed for an average of 6.4 years before decompensation. All patients fused the Worth-4-dots. There was no measurable stereoacuity in 2 patients. However, somewhat unexpectedly, 5 patients were found to have gradual improvement in their stereoacuity to record higher grade (60 seconds of arc or better) by the end of the follow-up period.

Conclusions: The MFS is a relatively stable binocular status but may change with time. A small percentage (9.3%) may decompensate during the follow-up period. However, an equal percentage of MFS patients (7.8%) may demonstrate evolution to 60 seconds or better stereoacuity when followed for a sufficient interval of time.

Discussant: **Kenneth W. Wright**

18. COULD BENZALKONIUM CHLORIDE PARTICIPATE TO TRABECULAR MESHWORK DEGENERATION IN GLAUCOMA? CME

Christophe Baudouin*♦, Alexandre Denoyer, Francoise Brignole-Baudouin♦

Purpose: Long-term antiglaucomatous drug administration may cause irritation, dry eye, allergy, subconjunctival fibrosis, or increased risk of glaucoma surgery failure, potentially caused by the preservative, benzalkonium chloride (BAK), whose toxic, proinflammatory, and detergent effects have extensively been shown experimentally. We hypothesize that BAK may also cause or aggravate trabecular meshwork (TM) degeneration.

Methods: Trabecular specimens were examined using immunohistology and RT-PCR. A trabecular cell line was stimulated by BAK and examined for apoptosis, oxidative stress, fractalkine and SDF-1 expression, and modulation of their receptors. An experimental model was developed with BAK subconjunctival injections to induce TM degeneration. Mass spectrometry imaging (MSI) assessed BAK penetration after repeated instillations in rabbit eyes.

Results: Trabecular specimens showed extremely low densities of trabecular cells and presence of cells expressing fractalkine and fractalkine receptor and their respective mRNAs. Benzalkonium in vitro induced apoptosis, oxidative stress, and fractalkine expression and inhibited the protective chemokine SDF-1 and Bcl2, also inducing a sustained IOP increase, with dramatic apoptosis of trabecular cells and reduction of aqueous outflow. MSI showed that BAK could access the TM at measurable levels after repeated instillations.

Conclusions: BAK enhances all characteristics of TM degeneration typical of glaucoma, namely trabecular apoptosis, oxidative stress, induction of inflammatory chemokines, and causes degeneration in acute experimental conditions, potentially mimicking long-term accumulation. BAK was also shown to access the TM after repeated instillations. These findings support the hypothesis that antiglaucoma medications, through the toxicity of their preservative, may cause further long-term trabecular degeneration and therefore enhance outflow resistance, thus reducing the impact of IOP-lowering agents.

Discussant: **Mark Sherwood**♦

Scientific Program

POSTER ABSTRACTS

PLEASE NOTE THE FOLLOWING PROGRAM KEY

Bold = AOS Member
♦ = Financial Disclosure

Note that poster authors will be available to discuss their work on Saturday, May 18 from 9:45 AM–10:40 AM.

1. APPROPRIATE USE OF IMAGE GUIDANCE SYSTEMS IN COMPLEX SINO-ORBITAL SURGERY

Ali Mokhtarzadeh, **George B. Bartley**, John F. Pallanch♦, Elizabeth A. Bradley, James A. Garrity

Purpose: Advances in medical imaging have led to the development of highly accurate image guidance systems, allowing real-time intraoperative determination of precise anatomic position. The use of intraoperative image guidance has been reported for orbital decompression, orbital tumor surgery, orbital fracture repair, debridement and drainage of infections, removal of orbital foreign bodies, placement of a Jones lacrimal bypass tube, and the management of sinus disorders affecting the orbit. This study summarizes a series of complex sino-orbital operations aided by image-guided navigation performed at Mayo Clinic with particular attention to the additional radiation and the incremental financial expense associated with the procedures.

Methods: Retrospective chart review. Radiation exposure using the volume computed tomography (CT) dose index (CTDIvol) and incremental costs were compared with standard sino-orbital surgery.

Results: Intraoperative image-guided navigation provides valuable information that improves clinical outcomes and safety but entails additional radiation exposure and expense. In our series, radiation exposure from preoperative CT imaging ranged from 26.80 to 69.11 milligray (mGy). After the initial investment in the guidance system, incremental cost per case was approximately $150.

Conclusions: Intraoperative image-guided navigation facilitates anatomical localization in complex sino-orbital surgery, albeit with increased radiation exposure and financial expense. The technology seems justified in the following situations:
1. Reconstruction of severely distorted orbital anatomy secondary to neoplasm, infection, trauma, developmental anomalies, or prior surgery.
2. Resection of a sino-orbital mass abutting dura or reconstructed intracranial lining.
3. Biopsy of an infiltrative or inflammatory mass with similar consistency to orbital fat.
4. Bone removal adjacent to the optic nerve or skull base.

2. PLATEAU IRIS AS ARRESTED DEVELOPMENT

Hermann D. Schubert

Purpose: Plateau iris is an anatomic configuration of the iris root featuring anteriorly displaced retroiridal ciliary processes flattening (plateauing) the ciliary iris with a potential to narrow and close the anterior chamber angle. Anterior displacement of the corona ciliaris had been noted by the author as a normal configuration in lower vertebrate species. If this were generally true, anterior displacement could be a normal finding in early phylogenesis and an arrested stage in human ontogenesis.

Methods: The teaching collection of the Algernon Reese Laboratory of ophthalmic pathology has a collection of "comparative anatomy". The slides were labeled by vertebrate species without documentation of individual ages. Histological slides were stained with Hematoxilin-Eosin and examined using a light microscope.

Results: Rat, fantail goldfish, guinea pig, rabbit, cat, goat and ox had retroiridal anteriorly displaced ciliary processes; mouse, dog and pig had not.

Conclusions: Retroiridal displacement of ciliary processes was a common finding (6 of 9) in lower vertebrates of unknown ages. In the embryological human literature, the same configuration has been described to occur between 6 and 9 months post conception suggesting that plateau iris may represent arrested development.

3. IMPROVED VITREOUS PROTEOMIC ANALYSIS TO DETECT TREATMENT TARGETS IN PATIENTS WITH MACULAR EDEMA

Jeffrey M. Sundstrom, **Thomas W. Gardner**♦

Purpose: Bioactive molecules in the vitreous are currently targeted for the treatment of macular edema arising from CRVO, but many patients fail to respond to anti-VEGF therapy or steroids. A comprehensive analysis of vitreous fluid in control and CRVO patients is required to further understand disease mechanisms and identify novel therapeutic targets.

Methods: Vitreous samples were obtained from patients undergoing PPV (macular hole) or prior to intravitreal injection. Proteomic analysis was conducted using electron spray ionization mass spectrometry (ES-IMS/MS) on samples prior to and after removal of abundant proteins, such as albumin and immunoglobulins. MS data were analyzed using the Trans-Proteomic Pipeline and spectral counts were determined using ABACUS software. Pathway analysis was conducted using Gene Ontology and Kyoto Encyclopedia of Genes and Genomes.

Results: In undiluted samples, 727 proteins were identified in controls and 686 proteins were identified in CRVO, but after removal of abundant proteins, identification improved to 1120 proteins in controls and 1065 proteins in CRVO. A combined inventory of 1293 proteins were identified across both groups and preparation conditions. Pathway analysis suggested that the vast majority of proteins were glycosylated as expected in extracellular fluids. The complement system and kallikrein-kininogen system were elevated in CRVO compared to controls.

Conclusions: To the best of our knowledge, this is the highest protein identification in vitreous to date, and the data suggest the importance of this approach to optimize treatment targets such as the complement and kallikrein-kinin systems that may play a role in the development of macular edema from CRVO.

4. NEURO-OPHTHALMOLOGIST LOOKS AT THE CAVERNOUS SINUS. DIFFERENTIAL DIAGNOSIS AND DIAGNOSTIC TECHNIQUES

Steven A. Newman

Purpose: The cavernous sinus represents an intracranial extradural extension of the orbit. As such, pathology affecting the cavernous sinus usually presents with ophthalmic signs and symptoms including diplopia, sensory loss, proptosis, and venous engorgement. While imaging studies have revolutionized our ability to make a diagnosis, even the most advanced CT and MRI techniques lack specificity.

Methods: A retrospective study of a series of 347 patients referred for various neuro-ophthalmic signs and symptoms found to have evidence of cavernous sinus pathology seen at a single institution over a 12 year period. In addition, a case controlled series of patients undergoing various minimally invasive diagnostic techniques permits specific diagnosis of cavernous sinus pathology and this directed treatment.

Results: A retrospective series demonstrates predominance of neoplastic lesions (65%) (most commonly benign) followed by vascular (28) and inflammatory (6%). Noninvasive techniques included the use of fine needle aspiration biopsy (through the skull base or orbit) transsphenoidal endoscopic biopsy, and translateral orbital extradural approaches. Specific diagnosis of cavernous sinus lesions was possible in 60% of patients undergoing trans foramen ovale fine needle aspiration biopsy. Two patients underwent trans superior orbital fissure biopsy in the setting of no light perception. When more tissue was necessary transsphenoidal endoscopic biopsy provided larger specimens, and in two cases, outpatient translateral orbital biopsy permitted specific diagnosis without craniotomy. In the presence of neurotropic spread of cancer, distal biopsies (supra orbital and inferior orbital nerves) permitted specific diagnosis without more invasive techniques.

Conclusions: Ophthalmologists are particularly suited to diagnose cavernous sinus pathology. A combination of endoscopic, fine needle aspiration biopsies, and additional periorbital techniques often permit specific diagnosis. These techniques are particularly useful in patients with malignancy and some inflammatory conditions, avoiding craniotomy.

5. PARS PLANA VITRECTOMY WITH ENDODRAINGE OF CHRONIC, REFRACTORY SEROUS MACULAR DETACHMENT ASSOCIATED WITH OPTIC DISC PIT

Vinod Lakhanpal, Gopal Patel, Tanya Albukh, Rohit R. Lakhanpal

Purpose: To report a new surgical technique in management of refractory serous macular detachment (SMD) from optic disc pit (ODP).

Methods: A 17 year old male was referred on March 6,2007 for loss of vision in left eye of six weeks duration. On exam the right eye was 20/20 and completely normal. Left eye vision was 20/200. Fundus exam revealed a SMD with a 0.4 disc diameter pit on temporal margin of optic disc. Fundus fluorescein angiography showed hypoflourescence at the ODP. OCT showed SMD with schisis with central foveal thickness (CFT) of over 700um.

Results: Patient underwent pars plana vitrectomy (PPV), endolaser to the temporal rim of optic disc and 8% C3F8 air fluid gas exchange on March 15, 2007. Posterior hyaloid was very adherent and could not be removed. Post operatively the SMD did not flatten. On August14, 2007 second PPV with posterior hyaloid separation was achieved. Follow up showed visual acuity of 20/70 with some resolution of SMD to CFT at 425um. Patient was followed up for for 16 months without complete flattening of macula. On December 16, 2009 visit, vision dropped to CF. A repeat PPV with internal retinotomy and endodrainage at SMD was performed. Follow up revealed resolution of SMD with CFT at 167um. A significant cataract required cataract surgery with lens implantation. Eighteen months after the last surgery, exam on July21, 2011, showed vision of 20/40 with complete resolution of SMD.

Conclusions: SMD associated with ODP may be managed by a variety of surgical techniques including PPV, endolaser and gas tamponade. However, some cases, especially those associated with schisis, may need endodrainage of SMD to achieve full resolution.

6. DACRYOCYSTORHINOSTOMY FOR ACQUIRED NASOLACRIMAL DUCT STENOSIS IN THE ELDERLY (>80 YEARS OLD)

Kyle N. Klingler, **George B. Bartley**, James A. Garrity, **John J. Woog**, Elizabeth A. Bradley

Purpose: The incidence of acquired nasolacrimal duct obstruction (NLDO) increases with advancing age. Dacryocystorhinostomy (DCR) is considered the definitive treatment for NLDO. DCR enjoys a high success rate (65-100%) with a low complication rate (1-6%). However, surgical outcomes have not previously been reported specifically for an elderly population, in which there may be increased risk for intra- and postoperative complications.

Methods: A retrospective cohort study was performed of all patients ≥80 years of age undergoing external DCR at the Mayo Clinic between 1 January 1990 and 31 December 2010. A matched control group of younger patients (40-79 yo) undergoing external DCR by the same surgeons was also reviewed. There were 2 controls for each study patient. Primary endpoint was symptomatic improvement at last follow-up. Secondary endpoints included anatomic patency and adverse event rate.

Results: There were 44 DCRs (33 patients) in the elderly group. The control group consisted of 73 DCRs in 62 patients. Elderly patients had longer symptom duration at presentation and were more likely to have bilateral disease (p=0.03). Resolution of symptoms at last follow-up was 66% in the elderly group vs. 87% in the younger cohort (p=0.02). Although there was no difference between groups with respect to common postoperative complications, there was a higher rate of pre-defined serious complications in the elderly group (5 events vs. 1 event; p=0.01). There was no difference between groups regarding need for additional eyelid surgery (p=0.30).

Conclusions: DCR surgery is associated with less symptomatic relief for elderly patients compared to their younger counterparts. The risk of routine complications is similar between the groups. The risk of serious complications is higher in the elderly group.

7. THE AMERICAN HEALTH CARE CRISIS. FOLLOW THE MONEY

Irene H. Ludwig, Malcolm R. Ing

Purpose: The American health care system is spiraling into an ever-increasing financial crisis. Despite unsustainable yearly increases in health insurance premiums and government medical expenditures, provider payments are being slashed to equally unsustainable levels. Most presentations and written reviews of the issue begin with the same unsubstantiated phrase; "Technology and drug prices have increased the cost of health care, therefore we must do more to control costs." This statement is usually followed by recommendations for tighter bureaucratic control. The purpose of this study is to investigate the root causes of the crisis. A proposal is offered for comprehensive study of costs, suggesting practical solutions after identification of said factors.

Methods: Health policy specialists, legislators and their aides, health industry legal consultants, and executives were informally polled to determine their estimates of the percentage of the health care dollar spent on bureaucracy. Health care providers, (physicians, nurses), were also surveyed.

Results: Active health care providers had vastly higher estimates of bureaucratic burden (50-90%), than did analysts and other administrative persons (25-40%). Private practitioners and younger health care providers gave the highest estimates. Since the survey was performed, the Affordable Care Act (ACA) was designed primarily to control and monitor physicians' fees and services, thereby increasing bureaucratic costs. The ACA contained no significant statutes or regulations to control drug prices or the cost of defensive medicine (tort reform), ignoring two components of cost.

Conclusions: There is an enormous difference in the perceived bureaucratic costs to health care between those controlling the system, either by policy or business practice, and those trying to deliver care within it. Accurate data is needed to prevent the inevitable collapse of the entire system. A large-scale, government or AMA-sponsored study is indicated. Detailed studies are needed to probe real costs without flawed economic assumptions. Targeted solutions can then be implemented.

8. MACLAR HOLE SURGERY WITHOUT FACE DOWN POSITIONING: A RETROSPECTIVE REVIEW OF 81 CONSECUTIVE CASES USING MODERN SURGICAL TECHNIQUES

Paul E. Tornambe, Nikolas J. S. London

Purpose: To evaluate the success rate following surgical repair of full-thickness macular holes without face-down positioning in a large series.

Methods: A retrospective chart review of 81 consecutive patients with idiopathic full-thickness macular holes <750m in diameter were treated with standard surgical techniques by a single surgeon (PET). Surgical technique included 23-gauge pars plana vitrectomy, ICG-assisted peeling of the internal limiting membrane, and fluid-gas exchange with 25% SF6 gas. All patients were either pseudophakic or rendered pseudophakic at the time of surgery. None of the patients were instructed to position face down at any time following surgery, but were instructed to avoid supine positioning. Post-operative optical coherence tomography was obtained on all patients to document hole closure and as needed thereafter. Charts were reviewed for anatomic hole closure, best corrected final visual acuity, and the incidence of retinal detachment.

Results: The single operation success rate for macular hole closure was 97%. Visual acuity of 20/50 or better was attained in 84% of eyes. The incidence of retinal detachment was 3%.

Conclusions: Face down positioning is not necessary to successfully close macular holes, and substantially adds to the post-operative burden of patients.

9. EFFICIENT AND EFFECTIVE MANAGEMENT OF "BURNING, ITCHING AND TEARING" IN PATIENTS WITHOUT DIAGNOSTIC SIGNS

Allan J. Flach

Purpose: Define keratodynia as burning, itching and tearing unrelated to diagnosable ocular disease. Present the examination, patient education and treatment found successful, inexpensive and satisfying for patients with this syndrome.

Methods: Careful histories were taken from and complete ophthalmic examinations were performed upon hundreds of patients complaining of burning, itching and tearing over a ten to fifteen year period within the University of California San Francisco Department of Ophthalmology. Symptomatic patients without diagnostic signs of ocular disease were informed of their condition (keratodynia) and the pathophysiology underlying their symptoms. Thereafter, they were taught how to manage these symptoms with nonprescription medications and environmental and behavioral changes.

Results: All patients learned to recognize their symptoms as useful indicators for the existence of keratodynia. They learned to self medicate themselves with a combination of over the counter medications, cool compresses, and making appropriate environmental and behavioral changes to their satisfaction as will be discussed.

Conclusions: The symptoms of burning, itching and tearing in patients without diagnosable ocular disease can be called keratodynia. This syndrome can be managed to the patient's satisfaction and the physician's relief without excessive risk or expense for the patient or unnecessary repetition for the physician. Naturally, these patients must be reexamined at intervals to rule out the development of dry eyes, blepharitis, ocular allergies, nasolacrimal or other specific ocular diseases that might require more aggressive treatments.

10. THE OPTOKINETIC UNCOVER TEST: A NEW INSIGHT INTO INFANTILE ESOTROPIA

Michael C. Brodsky♦

Purpose: To ascertain whether subcortical visual input contributes to the asymmetrical monocular optokinetic responses that characterize infantile esotropia.

Methods: Optokinetic testing was performed in 7 patients with isolated infantile esotropia (5 untreated and 2 previously treated) and in 3 patients with infantile esotropia syndrome associated with mild neurological disease.

Results: All patients showed poor temporally-directed optokinetic responses that instantaneously improved when the occluded esodeviated eye was uncovered, exposing it to nasally-directed optokinetic motion. This improvement in optokinetic responses did not necessitate a fixation shift to the contralateral eye.

Conclusions: Nasally-directed optokinetic input to the esodeviated eye can supplement temporal monocular optokinetic responses in the fixating eye under binocular conditions. This nonfoveal optokinetic contribution suggests that monocular nasotemporal optokinetic asymmetry is partly attributable to subcortical visuo-vestibular responses mediated by nonfoveal retina.

11. BIRTH WEIGHT AS A RISK FACTOR FOR RETINOPATHY OF PREMATURITY WHEN GESTATIONAL AGE AT BIRTH IS 30 OR MORE COMPLETED WEEKS

Leslie Pierce, **Edward L. Raab**, Ian R. Holzman, Robin N. Ginsburg, Scott E. Brodie, Annemarie Stroustrup♦

Purpose: This study examines whether birth weight less than 1,500 grams, considered a risk factor for loss of vision from retinopathy of prematurity (ROP) under present guidelines for the United States and Canada, is relevant when gestational age at birth is at least 30 completed weeks.

Methods: A retrospective study, from a major urban institutional Neonatal Intensive Care Unit, of infants whose gestational age at birth was 30 or more completed weeks but whose birth weight was less than 1,500 grams. Observation of whether ROP was present and its need for treatment under current guidelines were made from initial and follow up examinations of 266 infants.

Results: There were 212 observed final outcomes. One infant (0.5%) required treatment for severe ROP. We observed 211 infants (99.5%) to reach vascularization through retinal zone 3. The calculated occurrence rate for ROP requiring treatment in these neonates (95% confidence interval) is 0.01 to 2.6%. Although not included in the outcome, an additional 25 neonates showed normal vascularization in zone 2 at their 36th postmenstrual week or later. Only 10 infants showed some degree of ROP throughout their course.

Conclusions: The risk of a premature infant developing ROP severe enough to require treatment, when gestational age at birth is at least 30 completed weeks, appears to be extremely low regardless of birth weight. However, results from other similar studies are required for more certainty. If these findings are confirmed, examination guidelines should be revised for this apparently different subgroup of at-risk infants. Regional and socioeconomic differences among populations may affect applicability of these results.

12. AJCC STAGING AND MULTIDISCIPLINARY MANAGEMENT OF MERKEL CELL CARCINOMA OF EYELID

Bita Esmaeli

Purpose: Merkel cell carcinoma (MCC) is a rare neuroendocrine tumor with approximately 1500 new cases diagnosed each year in the United States. Despite 5823 cases of MCC identified in the National Cancer database,information regarding periocular MCC remains scarce. The goal of this report was to assess the value of AJCC classification for MCC of eyelid and its correlation with outcomes. We also reviewed the multidisciplinary management of eyelid MCC.

Methods: The medical records of 17 patients with eyelid MCC treated over 14 years. The outcome measures included: tumor size, tumor location, nodal status at presentation, local therapy, treatment for regional nodes, regional nodal metastasis and distant metastasis, survival status at last follow-up and follow up time. All patients were staged according to the AJCC criteria for Merkel cell carcinoma as well as for eyelid carcinoma.

Results: All patients had surgical excision followed by post-operative adjuvant radiation treatment to the tumor bed. Three patients had sentinel lymph node (SLN) biopsy; two had a positive SLN and one had a negative SLN; another 2 patients had palpable lymphadenopathy at presentation. Systemic chemotherapy was administered to six patients. Two of 8 patients (25%) with T2b or greater tumors developed metastatic disease and had tumor related mortality, while no metastasis or tumor related deaths occurred in patients with less than T2b tumors.

Conclusions: AJCC TNM designation for eyelid carcinoma correlates with lymph node metastasis and survival in patients with eyelid MCC. About 25% of patients with eyelid MCC greater than or equal to T2b develop metastasis and die of their disease.

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