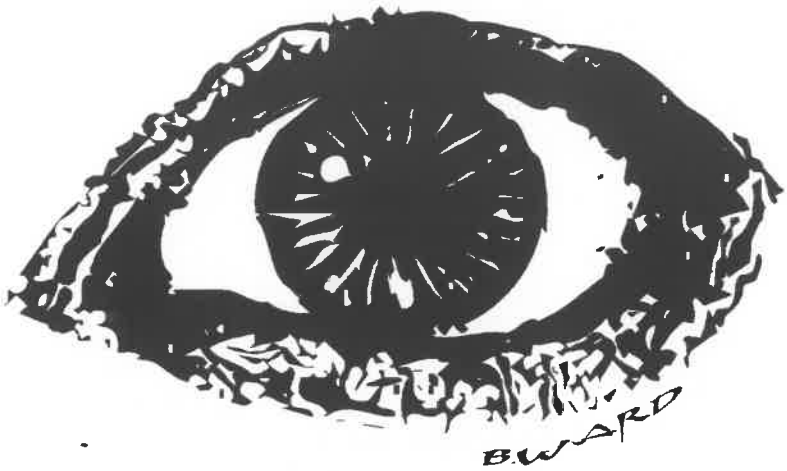

RESIDENT/FELLOW RESEARCH DAY

May 2, 1998

DEPARTMENT OF OPHTHALMOLOGY

THE UNIVERSITY OF IOWA COLLEGE OF MEDICINE

THE UNIVERSITY OF IOWA HOSPITALS & CLINICS

IOWA CITY, IOWA

Braley Conference Room
01136 Lower Level
Pomerantz Family Pavilion
8:00 - 12:00

RESIDENT/FELLOW RESEARCH DAY - 1998

DEPARTMENT OF OPHTHALMOLOGY

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RESIDENT/FELLOW RESEARCH DAY - 1998

FELLOWS

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Yaffa K. Weaver, M.D.

NEURO-OPHTHALMOLOGY
Anil D. Patel, M.D.

OCULAR PATHOLOGY
Thomas C. Cannon, M.D.

OCULOPLASTICS
Mark A. Alford, M.D.

PEDIATRIC OPHTHALMOLOGY
Catherine C. Betor, M.D.
Mei L. Mellott, M.D.

VITREORETINAL DISEASE
Jeremiah Brown, Jr., M.D.
Alan J. Franklin, M.D., Ph.D.
Raj K. Maturi, M.D.
Peter L. Sonkin, M.D.

RESIDENT/FELLOW RESEARCH DAY - 1998

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Scott E. Stice, M.D.
Darwin B. Wooten, M.D.

Dianna L. Bordewick, M.D.
Kean T. Oh, M.D.
Kristie K. Shappell, D.V.M., M.S., M.D.

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Christian L. Hess, M.D.
Brian E. Nichols, M.D., Ph.D.

Richard C. Allen, M.D., Ph.D.
Susan M. Brown, M.D
Andrea Lusk, M.D.

FIRST-YEAR RESIDENTS

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John R. Kinder, M.D.
Hunter T. Newsom, M.D.
Luis C. Omphroy, M.D.
Stacy L. Thompson, M.D.

ORTHOPTIC STUDENTS

Jaclyn L. Jirsa
Allison Thalacker

RESIDENT/FELLOW RESEARCH DAY

Saturday
May 2, 1998

SCHEDULE OF EVENTS

8:00 - 10:00	Presentations 1 - 8
10:00 - 10:30	Break
10:30 – 11:30	Presentations 9 - 13

RESIDENT/FELLOW RESEARCH DAY
SCHEDULE OF EVENTS

SATURDAY, May 2, 1998

RESIDENT/FELLOW RESEARCH DAY
SCHEDULE OF EVENTS

SATURDAY, May 2, 1998

To Be Presented at Morning Rounds

Sensitivity and Specificity of Frequency Doubling Perimetry in Neuro-ophthalmologic Disorders

R Neahring, M Wall and K Withrow

Purpose: Frequency doubling perimetry (FDP) is a method of visual field assessment utilizing a 25 Hz alternating contrast grating stimulus in an attempt to isolate the M_y cells. It is effective in screening for glaucomatous visual field loss. The purpose of this study was to determine the sensitivity and specificity of FDP compared with conventional automated perimetry (CAP) in neuro-ophthalmic disorders. **Methods**: FDP and CAP were performed on patients with various neuro-ophthalmic disorders and normals. The tests were compared based on total deviation probability plots for test loci common to the two perimetric tests. A Chi-Square test was used to evaluate for differences between the methods. Our gold standard was an unequivocal clinical diagnosis. **Results**: We tested 114 subjects with neuro-ophthalmic disorders and 59 normal subjects. The sensitivity of FDP was 76.3%. Its specificity was 88.1%. The sensitivity of CAP was 85.1%. Its specificity was 84.7%. The sensitivities and specificities were not significantly different by the Chi-Square test. In subjects with disease, the similarity of the defect shown on FDP and CAP was judged to be good or fair in 105/114 cases. The extent of the defect on FDP and CAP was equal in 39/114 cases, more extensive on FDP in 27/114 and more extensive on CAP in 44/114 cases. **Conclusions**: FDP is similar to CAP in its sensitivity and specificity for detecting visual field defects. The defects demonstrated by both are similar in the extent and shape of the defects.

Supported by Welch Allyn, Inc. VA Merit Review (MW) No Proprietary Interest

A Prospective Analysis Of 19 Consecutive Patients With Traumatic Optic Neuropathy

Mark Alford, Keith Carter, Jeffrey Nerad

Introduction: Traumatic optic neuropathy is defined as an impact injury to the optic nerve resulting in partial or complete visual loss without evidence of injury to the eye or optic nerve. While seen in between 2 to 15 percent of patients with facial fractures and head trauma, traumatic optic neuropathy may be associated with seemingly trivial head injury. At our institution where the majority of our patients present unable to cooperate with visual acuity testing, a high level of clinical suspicion and the identification of a relative afferent pupillary defect (RAPD) are required for diagnosis. At present, no studies validate a particular approach to the treatment of traumatic optic neuropathy other than suggesting that some form of treatment is better than no treatment at all. **Methods**: Patients presenting to the UIHC following head and facial trauma were examined for evidence of traumatic optic neuropathy based on the presence of a RAPD or vision loss. Patients with evidence of ocular or direct optic nerve trauma were excluded. All patients were started on methylprednisolone at doses used in the National Acute Spinal Cord Injury Study 2 trial (30mg/kg loading dose followed by 5.4mg/kg/day for 48 hours). Patients were followed twice daily for evidence of improvement in the RAPD or visual acuity. **Results**: Nineteen patients were enrolled in the study over the past 23 months. Patients ranged in age from 12 to 78 years old with an average age of 27 years old. Eighteen of the nineteen patients were male. Motor vehicle accidents and assaults accounted for all but one of the cases. Orbital fractures were seen in 10/19 patients with optic canal fractures seen in just 4/19. In 16/19 patients, the diagnosis was made solely on the basis of the RAPD. The RAPDs ranged in severity from 0.6 to >3.0 Lu with an average of 2.03 Lu. The majority (11/19) of the RAPDs were 2.1 log units or greater. No patient with a RAPD of 2.1 Lu or greater had visual recovery to better than HM visual acuity. Seven of the 11 patients with RAPDs greater than 2.1 Lu were NLP following treatment. All patients with an initial RAPD of less than 2.1 log units showed improvement in the RAPD and had vision at follow-up visits of 20/30 or better. Five patients were 20/20 post treatment. **Conclusions**: To date, this study represents the largest prospective series of patients with TON treated with megadose IV methylprednisolone as used in the NASCIS2 trial. Patients with less severe optic nerve injury improved on steroid treatment while no patients with more severe injury based on the initial RAPD (>2.1 log units) improved. In our institution, most patients with TON present in a comatose state and diagnosis is based on the evidence of a RAPD. While visual recovery is possible following TON, the likelihood of is low if the initial RAPD is greater than 2.1 log units. A drawback of this study is the lack of control subjects that might help to illuminate the unclear natural history of this condition. However, other investigators have already shown that treatment (steroids or optic canal decompression) is more beneficial than observation alone. Until a randomized, controlled, prospective study can be initiated, the treatment of TON with methylprednisolone remains a viable option.

The Clinical Significance Of HLA (Human Leukocyte Antigen) Antibodies In High Risk Corneal Transplantation

((Bordewick D., Brown J., Mathers W., Sutphin J., Goeken N., Wollenzien J.))

Purpose: This study was designed to investigate if the presence, or development of HLA specific antibodies are predictive of corneal graft rejection in high risk pateints. **Methods**: Fifty-one high risk patients were involved in this prospective study. A high risk cornea was defined as two or more quadrants of stromal vascularization (n=12) or previous graft failure (n=39). HLA antibodies were drawn at the following times: prior to penetrating keratoplasty (PK), aproximately one month, six months and one year following PK. Pateints were followed closely for graft failure or rejection. **Results**: HLA speific IgG was found in the serum of nine patients at baseline or during the first year following PK. The patients in this group expereinced: two graft rejections (2/9) 15%, six failures (6/9) 67%, and one clear graft (1/9) 11%. HLA specific IgM was found in the serum of twelve patients. This group expereinced: two rejections (2/12) 17%, six failures (6/12) 50%, and five clear grafts (5/12) 43%. Six patients demonstrated IgM at baseline or early following PK with subsequent conversion to IgG. The patients in this group all progressed to graft failure (6/6) 100%. Thirty-seven patients did not demonstrate antibodies at any point in the study. There was one graft failure and one rejection in this group. Thity-five grafts remained clear (94%). **Conclusions**: Patients who did not demonstrate HLA specific antibody at any point in the study had excellent graft survival. Patients with pre-existing antibody, and those who developed antibody had a high rate of graft failure. Conversion from IgM to IgG appears to have a particularly poor prognosis for graft survival. HlA antibody studies may be clinically useful in predicting which corneal grafts are likely to fail and may help guide treatment decisions.

Prevalence Of Mitochondrial Nt3243 Mutation In Non-Syndromic Pattern Dystrophy

((B.E. Nichols, N. Butler, V.C. Sheffield, E.M. Stone)) University of Iowa Department of Ophthalmology & Visual Sciences, Iowa City, IA.

Purpose. The syndrome of maternally inherited diabetes, deafness, and macular pattern dystrophy has been shown to be caused by an A to G transition mutation at mitochondrial nucleotide 3243 (in the mitochondrial leucine tRNA gene). This study was designed to determine the frequency of this mutation in patients with the clinical diagnosis of non-syndromic pattern dystrophy. **Methods**. All patients with the clinical diagnosis of pattern dystrophy were selected from a set of more than 1000 probands affected with a variety of macular diseases. Two hundred and four patients were included in the study. The A to G mutation at position 3243 creates a restriction endonuclease site for the enzyme Apa I. The polymerase chain reaction (PCR) was used to amplify a 282bp segment flanking nucleotide 3243 in all patients as well as from a patient known to harbor the 3243 mutation. These PCR products were digested with Apa I and electrophoresed on non-denaturing 6% polyacrylamide gels. **Results**. No patients affected with pattern dystrophy were found to harbor the mutation at nucleotide 3243 in the mitochrondial genome. **Conclusions**. The A to G mutation at nucleotide 3243 is at most a very rare cause of non-syndromic pattern dystrophy.

Research to Prevent Blindness, Foundation Fighting Blindness None

Marginal Myotomy of the Inferior Oblique

((M Mellott, W Scott, R Keech)) Department of Ophthalmology, University of Iowa Hospitals and Clinics, Iowa City, IA

Purpose. In almost masked bilateral superior oblique palsy (BSOP), there is asymmetric inferior oblique overaction (IOOA) with a vertical deviation in primary position. If bilateral inferior oblique recessions are performed, surgery on an additional vertical muscle is necessary to correct the vertical deviation in primary position. We report the results of marginal myotomy of the inferior oblique in the correction of asymmetric IOOA. **Methods.** Six patients with almost masked BSOP had evidence of asymmetric IOOA by versions and by reversal of hypertropia in side gaze. All patients underwent a recession or myectomy of the greater overacting IO and a marginal myotomy of the lesser overacting IO. A marginal myotomy was performed by making two incisions through 2/3 width of the inferior oblique muscle and in opposite directions in order to lengthen the muscle. **Results.** Followup time ranged from 6 weeks to 2 years. Preop vertical deviation ranged from 5 to 20 prism diopters of hypertropia. Preop IOOA ranged from 0 to +2 in the lesser overacting IO and +2 to +4 in the greater overacting IO. Postoperatively all patients had 0 to + IOOA. On last followup visit, four patients had no vertical deviation in primary position, and one patient had two prism diopters of hypertropia. The sixth patient had eight prism diopters of residual hypertropia. **Conclusions.** Almost masked BSOP with asymmetric IOOA can be corrected with a marginal myotomy of the lesser overacting IO performed with either a recession or myectomy of the greater overacting IO. This procedure corrects the lesser overacting IO, avoids the development of IOOA, and corrects the vertical deviation in primary

Clinical Course and Management of Adult-onset Coats' Disease

Franklin, AJ, Maturi-RK, Oh KT, Stone EM, Folk JC

Purpose: To determine the clinical progression and response to photocoagulation of adult-onset Coats' disease. **Methods**: Retrospective case review. **Results**: Six patients showed progression of abnormal vessels on follow-up. Focal laser photocoagulation caused regression of the abnormal vessels and associated retinal edema resulting in visual improvement. **Conclusion**: Adult-onset Coats' disease demonstrates clinical spread of telangiectatic vessels to areas of previously normal retina over time. Photocoagulation of the abnormal vessels promotes resolution of exudation.

Five Generation Von Hippel-Lindau Family from Iowa Found to Have the Black Forest Mutation

(R.C. Allen, C.M. Taylor, A. Webster, and E.M. Stone)

Purpose: Von Hippel-Lindau (VHL) disease is an autosomal dominant condition characterized by a predisposition to develop retinal angiomas, hemangiomas of the central nervous system, renal cysts and renal clear cell carcinomas, pheochromocytoma, pancreatic cysts and islet tumors, and cystandenomas of the epididymis. The gene responsible for VHL has been identified and is a tumor suppressor gene, consisting of three exons, which maps to 3p25-26. We have 51 individuals at the University of Iowa Hospitals and Clinics (UIHC) affected with VHL and are in the process of studying these individuals and their families by linkage analysis and mutation identification, in order to assist in presymptomatic diagnosis. **Methods**: Fifteen short tandem repeat polymorphic markers flanking the VHL gene were used to perform linkage analysis on 32 apparently unrelated families with members affected with VHL. Primers flanking each exon of the gene were designed for single strand conformation polymorphism (SSCP) analysis so that mutation identification could be performed. **Results**: The largest family in our study, consisting of five generations with 13 living affected members, was found to have a mutation at nucleotide 505 (T to C) of the VHL gene. This same mutation has been reported in 14 families from the Black Forest region of Germany, demonstrating a founder effect for this particular mutation. A detailed history of the family in Iowa found that one of the members immigrated from Baden-Baden, Germany in 1832, suggesting that the family in Iowa is related to the 14 families from the Black Forest region. **Conclusion**: A mutation at nucleotide 505 of the VHL gene has been found in the largest VHL family in our study. This represents 25% of VHL patients at UIHC. It is hypothesized that this family is related to the 14 families that trace their lineage to the Black Forest region in Germany. We are currently screening the rest of our VHL patients for this same mutation.

Vascular Disorders of the Optic Nerve Head in Patients with Obstructive Sleep Apnea

Jeffrey J. Jordan, M.D., Randy Kardon, M.D., Ph.D, Sohan S. Hayreh, M.D., Ph.D., D.Sc.

Background: Obstructive sleep apnea (OSA) causes profound hemodynamic effects which may compromise oxygen delivery to end organs, including the optic nerve. Depending on the anatomy of the circulation of the optic nerve head and watershed zones of the posterior ciliary arteries, some patients may be more susceptible to the above changes. **Purpose:** To determine the prevalence vascular disorders of the optic nerve head in a population of patients with OSA. **Methods:** The medical records of patients age 30 years and older examined at the University of Iowa Hospitals and Clinics Department of Ophthalmology and Visual Sciences from 1/1/84 to 11/ 26/96 who also had a polysomnogram scheduled during this time interval were reviewed. The data obtained included the result of the polysomnogram, age, the history of hypertension, diabetes, and coronary artery disease and the diagnosis of any eye disorder felt to be completely or partially vascular in nature, including anterior ischemic optic neuropathy (AION), normal tension glaucoma (NTG), primary open angle glaucoma (POAG), and primary open angle glaucoma suspect (POAGS). Sleep studies were graded and patients were analyzed by groups depending on the grade of their OSA. Patients were excluded if surgical treatments for obstructive sleep apnea were rendered prior to the sleep study, or if there was ocular disease that precluded the presence of a normal optic nerve or intraocular pressure. Seven hundred and ninety three patients fit the entry criteria for the study. **Results:** No patients without sleep apnea had a diagnosis of AION. 10 of 600 (1.7 %) patients with sleep apnea had AION, 4 of them (40 %) having bilateral disease. One of 193 (0.5 %) patient without OSA had NTG, while 3 of 600 (0.5 %) with OSA had NTG. Two of 193 (1.0 %) patients without OSA had POAG while 17 of 600 (2.8 %) of patients with OSA had POAG. Finally, 9 of 193 (4.7 %) of patients without OSA were POAGS, while 40/600 (6.7 %) of patients with OSA were POAGS. The statistical analysis of this data is in progress.

Effect of Visual Field Loss on the Waveform of the Pupillary Light Reflex

((D.B. Wooten, R.H. Kardon)) University of Iowa Hospital and Clinics and the Veterans Administration Medical Center, Iowa City, Iowa.

Purpose. Pupillary reactions during a continuous five second light stimulus consist of both a phasic and tonic component which can be demonstrated as a waveform plotting pupil size over time. The aim of this study was to compare the pupil waveforms of a damaged eye in response to varying intensities of light to waveforms of the normal fellow eye. This was done to better understand what components of the waveform are affected by damage and what to look for during clinical observation. **Mehtods.** Forty-five patients with an RAPD and visual field loss were tested by computerized pupillography. Each eye was stimulated with a light that was on for five seconds and off for five seconds. Seven different light intensities were used at 0.5 log unit increments over a 3 log unit range. A new technique of signal analysis was developed to analyze the waveform of the pupil responses to light stimuli and to estimate the relative afferent pupillary defect (RAPD) using the phasic (initial constriction) and the tonic (escape) portions of the response. **Results.** In some eyes the damage showed greater effect on the phasic portion of the response and in some eyes the tonic portion of the waveform was more affected. We are currently trying to determine the clinical relevance of decrease in amplitude of selective portions of the waveform and whether this is related to location of field loss, the etiology of damage, or the extent of damage. **Conclusions.** Preliminary results indicate that loss of the central visual field may cause more effect on the tonic portion of the pupil response to a constant light than the phasic portion. The clinical implication is that the degree of "pupillary escape" in relation to the amount of initial constriction may be related to what portion of the visual field has been damaged.

Supported by a VA Merit Review Grant Proprietary Interest: None

Pigment Dispersion Syndrome: Inheritance And Associated Characteristics

(A.L. Lusk, W.L.M. Alward)

Purpose: The pigment dispersion syndrome predisposes affected individuals to pigmentary glaucoma. The purpose of this study is to evaluate the inheritance pattern and analyze numerous characteristics for possible associations in transmission. In the current literature, a small number of authors have attempted to characterize the inheritance pattern of PDS without complete success. At this time, no large scale analysis has yet been attempted. The largest published study, *Archives of Ophthalmology, Vol 115, March 1997,* investigated inheritance patterns in 54 members of 4 families, 28 of whom showed clinical evidence of PDS. We have a data bank of at least 330 diagnosed PDS patients to investigate. **Method:** We will evaluate patients, who have been diagnosed with PDS, and their first degree family members. Evaluation will include routine demographics, Krukenberg spindles, iris color, transillumination defects and contour, refractive error, keratometry, anterior chamber depth, lens thickness, axial eye length, angle pigment, Humphrey visual field mean defect, cup to disc ratios, anisocoria, and heterochromia. When possible, pedigrees also will be constructed. Blood will be obtained from all affected members as well as from unaffected members of large pedigrees.

Results: TBD

Conclusion: TBD

Comparison of Nasal and Temporal Hemifield Decibel Sensitivity Using the Pupillary Light Reflex

((S. Hong, J. Narkiewicz, R.H. Kardon)) Dept. Ophthalmology, University of Iowa, Iowa City, IA. Dept. Ophthalmology, Kyungpook National University, Taegu, Korea

Purpose: To determine the decibel sensitivity difference in the pupillary light reflex between the nasal and temporal fields in normal subjects using a new technique to better understand what constitutes abnormal asymmetry in patients with optic nerve disease. **Methods:** Computerized, binocular, infrared pupillography was used to quantify the pupillary light reflex in response to hemifield, quadrant, and 4 degree perimetric stimuli in normal subjects. Stimuli differing in intensity produced a graded pupil contraction over a 20 decibel mesopic/photopic range. By using stimulus intensity-pupil response functions (characterized by the Naka-Rushton equation), the decibel sensitivity was derived at threshold and suprathreshold stimulus levels by arbitrarily defining different criterion responses (level of pupil contraction amplitude) and solving for the x value of decibel intensity using the Naka-Rushton curve fits. **Results:** In normal subjects, the sensitivity of the temporal pupil field is usually greater than the nasal pupil field by 3-5 decibels, but this varies between subjects and the two eyes and is a function of criterion level. Decibel sensitivity may also differ depending upon which pupil is recorded due to asymmetry in midbrain decussation of pupillary fibers. **Conclusions:** A new technique for determining decibel pupil sensitivity at different criterion levels allows a more direct comparison with visual sensitivity determined by standard automated perimetry. The effect of disease on the pupillary light reflex as it relates to stimulus brightness can also be studied.

Multifocal Electroretinogram (MERG) Analysis Of Macula-Off Retinal Detachments (RDs)

PL Sonkin, KT Oh, PA Moore, HC Boldt, RH Kardon: Department of Ophthalmology and Visual Sciences, University of Iowa Hospitals and Clinics, Iowa City, Iowa

Purpose: To evaluate retinal and foveal function in macula-off RDs. **Methods**: Seven patients with macula-off RDs were prospectively evaluated with serial MERG and Goldmann visual field (GVF) testing before and after surgical repair, with at least 6 months follow-up. **Results**: Suppressed retinal function corresponding to the area of detachment was seen preoperatively on MERG and GVF testing. Electrophysiologic and functional recovery as assessed by MERG and GVF testing correlated with visual outcome. **Conclusion**: MERG testing may be useful in evaluating retinal function in RDs and in predicting visual prognosis after repair.

Decision Management System for Analysis of Cataract Extraction Surgery Outcomes

Brown SM, Oetting T

Purpose: To set up a decision management system to analyze outcomes of cataract extraction surgeries performed at the Iowa City Veteran's Administration Medical Center and then once the system has been developed, to enter data and evaluate cataract extractions both retrospectively and prospectively. **Method:** The project consists of two main phases: 1) system planning, design and implementation and 2) outcome analysis. System planning, design and implementation consists of system planning, information planning, database and query/report design, system development and testing, user procedures and system modification and maintenance. Outcome analysis includes but is not limited to: visual acuity outcomes over time, visual acuity outcomes versus surgery time, complication rates, refractive outcomes and patient's ability to perform specific tasks pre- and post-surgery. **Results:** Pending. Over 50% of the data input portion of the system has been completed. A small test database has been entered. After completion of the data input portion of the system, development of the query/report portion of the system will begin. **Conclusions:** Pending. The system is to be used to assist in making decisions to improve quality of care and cost effectiveness.

Diagnosis of Recurrent Herpes Simplex Keratitits with the Polymerase Chain Reaction

Barnett EM, Perlman S, Mathers W

Objective: At present, the diagnosis of herpes simplex (HSV) keratitis is predominantly made on clinical findings. Several studies have shown the efficacy of using the polymerase chain reaction (PCR) to identify HSV DNA from tear and corneal disease with PCT is more difficult since corneal tissue has been shown to contain HSV DNA by PCR despite the absence of active viral infection. The objective of this study is identify cases of recurrent HSV infection by using reverse transcriptase PCR (RT-PCR) to identify HSV RNA transcripts, which are indicative of active infection. **Methods**: Tear samples and corneal scrapings of patients with currently unidentified corneal infections and documented or suspected past HSV keratitis will be obtained from patients presenting over a one year period to the Cornea Clinic. Samples will undergo both standard PCR and RT-PCR using HSV specific primers to identify HSV DNA and RNA, respectively. In patients who go on to penetrating keratoplasty, tissue samples from corneal buttons will be similarly analyzed for comparison with the initial results. **Results**: Pending. It is expected that patients will be identified who are negative by both assays and therefore have no evidence for HSV infection either presently or in the past. A second group of patients will be positive for PCR but negative for RT-PCR consistent with a past history of HSV keratitis by lack of active disease. Finally, a third group will be positive for both assays consistent with active disease. The results will also be analyzed to determine whether tear samples will be sufficient or if corneal scraping will be required to obtain accurate results. **Conclusion**: Pending. It is expected that RE-PCR will provide a clinically useful method of distinguishing recurrent HSV keratitis from past infection.

Radiation Induced Optic Neuropathy

Catherine Canada Betor, MD[1], Scott Forman, MD[2], Robert L. Lesser, MD[3]
[1] University of Iowa Hospitals and Clinics, Iowa City, Iowa, [2] New York Medical College, Valhalla, New York, [3] Yale University School of Medicine, New Haven, Connecticut

Purpose: This study reviews 19 eyes of 12 patients with radiation induced optic neuropathy (RION). **Method:** Retrospective chart review of patients with RION followed for 5-63 months (average 26.3 months). Nine patients received hyperbaric oxygen and intravenous methylprednisilone in a non-randomized fashion. **Results:** Patients received a mean of 5670 cGy of external beam radiation to their tumors (median 5220, range 4500-7000), and only one had fractionated doses greater than 200 cGy. One patient had 3000 cGy of stereotactic radiation. Three had adjunctive chemotherapy. RION developed a median of 15 months after radiation therapy (range 6 months-18 years). Patients noticed their decreased vision for a mean of 27.6 days (median 10 days, range 1 day-6 months) before seeking medical attention. Three eyes of 2 patients had gadolinium enhancing MRI lesions of the anterior visual system that pre-dated the clinical evidence of RION. Eight eyes had superior altitudinal field loss at presentation. The average documented loss of Snellen visual acuity was 8 lines without hyperbaric oxygen treatment, 5.46 lines with treatment (average final vision HM and 20/80, respectively). Hyperbaric oxygen treatment started on average 16.5 days (median 10 days, range 1-49 days) after the onset of clinical symptoms. Treated patients received 20-66 sessions (mean 31) of hyperbaric oxygen at 2.0-2.2 ATM for 90 minutes per session, and intravenous methylprednisilone 250 mg IV q6 x 12. Hyperbaria was tapered according to patients clinical signs and radiographic evidence of active RION. No patient experienced major side effects from hyperbaria or steroids. **Conclusions:** Patients treated with hyperbaric oxygen lost on average 2.5 fewer lines of Snellen acuity than untreated patients and had substantially better visual outcomes. This data adds further support that hyperbaric oxygen is of value of the treatment of RION, although small patient numbers and lack of randomization make it difficult to prove this with statistical significance. Pre-clinical radiographic evidence of RION may offer a treatment opportunity before vision loss occurs. A controlled clinical trial is desirable.

Detection of Hemosiderin in Experimental Central Retinal Vein Occlusion: Forensic Implications for Assessment of Timing in Suspected Child Abuse.

(T.C. Cannon, S.S. Hayreh, R. Folberg) The University of Iowa, Iowa City

Purpose: To investigate the time interval required for detection of hemosiderin in the retina using light microscopy and traditional iron staining methods available to most forensic pathologists. In addition, the effectiveness of sectioning the tissue at different levels was evaluated. **Methods**: Twenty eyes from 10 different primates that had undergone experimental central retinal vein occlusion (CRVO) with known time intervals between CRVO and enucleation, were evaluated with hematoxylin-eosin and Prussian blue stains after paraffin embedding and sectioning the tissue. The time intervals between CRVO and enucleation ranged from 2 days to 16.8 months. Each paraffin block of eye tissue was sectioned and stained at 5 different levels. A random identification number was generated for each slide in order to blind the evaluating pathologists. The pathologists evaluated the blinded slides for accumulation of blood by hematoxylin-eosin stain and hemosiderin by Prussian blue stain. **Results**: Results from the University of Iowa pathologists were scored for each slide. We are currently awaiting results of collaborating pathologist of East Carolina University section of forensic pathology before revealing the code of the blinded samples. **Conclusions**: Conclusions on completion of the study to be presented at rounds in the Department of Ophthalmology.

Topical Mitomycin C for the Treatment of Primary Acquired Melanosis and Malignant Melanoma of the Conjunctiva

Kevin Cuevas, William Mathers, John Sutphin

Purpose: To evaluate the efficacy of topical mitomycin C in the treatment of conjunctival primary acquired melanosis and malignant melanoma. **Methods**: Five eyes of five patients with primary acquired melanosis of the conjunctiva and five eyes of five patients with conjunctival melanoma were treated with topical mitomycin C at a concentration of either 0.02% or 0.04% three or four times daily. Duration of treatment ranged from two to six weeks. Follow up ranged from one to twenty mouths. Before the onset of therapy the diagnosis of primary acquired melanosis with atypia or conjunctival melanoma was confirmed by histopathology in all eyes. Throughout the treatment course, conjunctival biopsy specimens were obtained to evaluate the efficacy of the treatment. **Results**: After receiving topical mitomycin C, all five eyes showed complete regression of primary acquired melanosis with atypia. Three patients with conjunctival melanoma had complete regression of disease. One patient with a high-grade melanoma failed to respond to a six week course of topical mitomycin C and one patient had a partial response to a four week course of therapy. **Conclusion**: Topical mitomycin C may provide an alternative treatment for conjunctival primary acquired melanosis with atypia and melanoma.

Effect of Peripheral Choroidal Ablation on Choroidal Neovascularization in Age-related Macular Degeneration

Christian Hess, Stephen Russell

Background: Drusen and retinal pigment epithelial clumping in age-related degeneration are typically seen in the peripheral fundus corresponding to the choroidal lobular watershed zones. Similarly, choroidal neovascularization from age-related degeneration occurs primarily in the largest choroidal watershed region, the juxtafoveal choroid. Vascular watershed zones in other organ systems are more vulnerable to ischemia, especially chronic ischemia. Recent evidence suggests that age-related macular degeneration is highly associated with atherosclerosis and that choroidal vascular loss is prominent in age-related macular degeneration. Verhoff, Hayreh and others have previously proposed that age-related macular degeneration is a manifestation of chronic choroidal insufficiency.

Since retinal neovascularization is mediated by a diffusible vasoproliferative factor produced in ischemic areas of the retina, it is conceivable that choroidal neovascularization may result from a diffusible choroidal vasoproliferative factor. Studies by Bill and others have demonstrated that small molecules (50 K Dalton) freely diffuse within the choroidal stroma. **Purpose:** Considering that ablation of ischemic ocular tissue reduces neovascularization in other ocular disorders, we propose to evaluate whether ablation of the peripheral ischemic choroid in age-related macular degeneration may moderate neovascular elaboration in the macula. **Methods:** Twenty age-related macular degeneration patients with unilateral choroidal neovascularization of 3.5 or greater disc areas and visual acuity of 20/80 or worse who are not eligible for photocoagulation under the criteria of the Macular Photocoagulation Study, will be recruited to undergo circumferential cryoablation of the choroid from the equator to the ora serrata. Outcome analysis will include comparison of pre-treatment and post-treatment best corrected visual acuity using MPS protocol refraction, Goldmann visual field evaluation, contrast sensitivity, reading speed, and subjective outcome based on an instrument developed by the National Eye Institute (Visual Function Questionnaire-25). Parameters will be compared to the untreated group of patients of the MPS Foveal CNV Study or to an untreated AMD control group at The University of Iowa. Visual fields and fundus fluorescein angiogram will be analyzed both before and after peripheral choroidal ablation to determine if anatomical improvement, worsening, or detrimental visual field changes occur. **Current Status:** IRB approval was obtained in February of '98 for treatment of six patients in order to evaluate procedure safety. After six patients are treated, a report must be filed with the committee chair prior to further enrollment. Presently, three patients have been treated with six weeks of follow-up. Intermittent follow-up is scheduled through the first year post-treatment. Thus far, the procedure has been well tolerated. No convincing results are evident at this stage. We are continuing active enrollment.

Rapamycin As An Inhibitor Of Ocular Neovascularization

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Rapamycin is a powerful immunosuppressive agent currently undergoing Phase III clinical trials as a drug for the prevention of transplanted organ rejection. In addition to its immunosuppressive activities, Rapamycin has been shown to have a powerful effect on inhibiting neovascularization.

We are utilizing a porcine laser induced vein occlusion model to induce neovascularization. We will determine if this retinal neovascularzation can be inhibited by the use of oral rapamycin. To elucidate the mechanism of Rapamycin action, we will measure the expression of both vascular endothelial growth factor (VEGF) and a second intracelluar protein kinase (labelled Tor1p).

Retinopathy In The Koletsky Rat: Correlation Of Transmission Electron Microscopy And Light Microscopy With Funduscopic Evaluation

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Purpose: The obese Koletsky rat is an inbred strain of spontaneous hypertensive rats who are phenotypically obese. During aging they develop non-insulin dependent diabetes and are proposed as an animal model for Type II diabetes in humans. Our goal is to characterize the retinopathy of the Koletsky rat at both the light microscopic and transmission electron microscopic level and correlate our results with the funduscopic appearance. The findings will be used to determine if the Koletsky rat is an appropriate model for non-insulin dependent retinopathy in humans. **Methods**: Male and female obese Koletsky rats and lean control Koletsky rats will be evaluated at several ages of development to determine the optimal age for characterizing the retinopathy. Animals will be assessed for qualitative light microscopic changes, quantitative transmission electron microscopic change (retinal capillary basement membrane thickness), and qualitative funduscopic changes. **Results**: Preliminary findings suggest a process affecting outer retinal components, possibly secondary to compromised choroidal circulation. Evidence of neovascularization or thickening of the basement membrane was not identified with light microscopy in the initial animals studied. Data collection is in progress. **Conclusions**: Characterization of the retinopathy observed in Koletsky rats will require a larger sample size and ultrastructural evaluation.

Pupil Perimetry: Methods Of Threshold Determination And Comparison With Visual Responses

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Purpose: To determine an optimal method of pupil threshold determination, enabling pupil and visual threshold to be compared at different locations within the visual field. **Method**: Two different methods were compared for determining pupil threshold; one method used cumulative probability functions and the other used stimulus-response functions of the pupil. A computerized infrared pupillometer was linked to a Humphrey Field Analyzer to record pupil contractions to stimuli over a range of intensities at ten different locations in the visual field of normal subjects. **Results**: There was a highly linear correlation between pupil threshold determined by probability function compared to that determined from stimulus-response curves ($R^2 > 0.9$). Using these methods, the "hill of pupil threshold" was steeper compared to visual threshold under mesopic conditions. **Conclusions**: When the variability of pupil responses at a given stimulus intensity followed a normal Gaussian distribution, the two methods of threshold determination compared favorably. This implied that the stimulus-response curve at a given perimetric location can be used to derive threshold.

Excitatory Amino Acid Levels in the Vitreous of Humans with Glaucoma

Yaffa Weaver, Young Kwon, Sankar Baruah, James Folk

Purpose: To examine amino acid levels in human vitreous and explore the possible association with glaucoma. **Methods**: Undiluted vitreous specimens were obtained from patients undergoing pars plana vitrectomy for various retinal disorders. Clinical history including a history of glaucoma or ocular hypertension was obtained through patient interviews and review of the medical record. Amino acid analyses were performed by high-pressure liquid chromatography. **Results**: Fifty-four specimens have been analyzed to date. The mean vitreous glutamate concentration was 6.7 μmol/L. Eleven of the 54 patients had a history of glaucoma and had an average vitreous glutamate concentration of 6.6μmol/L. **Conclusions**: A previous study in patients with cataract and glaucoma demonstrated a twofold elevation of vitreous glutamate compared to patients with cataract alone. The present study does not confirm this finding, however, the posterior segment pathology, including proliferative diabetic retinopathy and retinal detachment, which prompted the vitrectomy might similarly be associated with altered concentrations of vitreous protein and amino acids.

RESEARCH

Research is an integral part of the residency. Of course, the primary goal of residents is to become good ophthalmologists. This requires that residents be in the clinic caring for patients during clinic hours. In this busy clinical residency, it is not always easy to find time to do research. Residents must plan carefully. Some clinical projects can be done during spare time in the clinics. Other projects can be done at the end of the day or on weekends.

During the first year of residency, as residents study the basic aspects of ophthalmology, certain topics will seem of special interest and worthy of in-depth study. With a member of the ophthalmology staff, a member of the university faculty, or another approved individual from outside of the university, the resident will develop a research plan. The resident should prepare a budget for the project, if appropriate. Seed money is available from the department to support worthy initial or preliminary projects.

An assigned faculty member will act as general supervisor for all resident research activities. The faculty member will approve the topic, advise on suitable sponsors, and help the resident arrange financial support for research activities.

Before submitting a paper for publication in a journal or presentation at a meeting, a resident must have the title and contents evaluated and approved by a member of the Ophthalmology faculty. Please read the Policy on Authorship.