

# Clinical and Histopathologic Diagnosis of Calcinosis Cutis

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**Purpose:** The purpose of this case series and literature review is to better define clinical and histopathologic characteristics of calcinosis cutis, a rare condition which can affect eyelid skin. **Methods:** A retrospective medical record review was conducted of all cases of histologically diagnosed calcinosis cutis at The New York Eye & Ear Infirmary from 1992 through 2008. Data were analyzed with respect to the location of the lesion, duration of symptoms, history of prior trauma, past medical history, and clinical impression. **Results:** Three cases were identified—two located on the lower eyelid and one at the medial canthus. The average duration of symptoms was 7 months. No prior history of trauma or systemic illness was elicited. **Conclusions:** Calcinosis cutis is a rare condition that should be included in the differential diagnosis of a benign-appearing eyelid lesion. While it can occur in patients with a history of inflammation, trauma, or hypercalcemia, its etiology can also be idiopathic.

## Comparison of In-Vitro Susceptibility Rates of Moxifloxacin and Azithromycin Against Representative Ocular Isolates from 1997-2007

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**Purpose:** To study the in-vitro susceptibility profiles of moxifloxacin and azithromycin against representative conjunctiva strains of *S. aureus*, *S. epidermidis*, *S. pneumoniae*, *S. viridans*, and *H. influenza* over the past decade.

**Methods:** 66 ocular isolates archived at the New York Eye and Ear Infirmary (NYEEI) from 1997-2007 from cases of bacterial conjunctivitis were tested for *in vitro* susceptibility against moxifloxacin and azithromycin. Etest<sup>®</sup> antimicrobial gradient strips were used for the quantitative determination of Minimum Inhibitory Concentration (MIC) for each organism. The MIC<sub>90</sub> was calculated and reported below. The MIC<sub>90</sub> represents the antibiotic concentration that would inhibit the growth of 90% of the tested bacterial isolates. All data was analyzed according to CLSI criteria based on serum concentrations. The archived organisms were subcultured on 5% sheep blood agar. A bacterial suspension was prepared from the subcultures and this suspension was swabbed on a Mueller-Hinton agar plate and incubated for 18-24 hours at 36°C. To facilitate growth, the streptococcus isolates were inoculated on the Mueller Hinton agar plate with 5% sheep blood. Etest<sup>®</sup> strips were applied and the MIC was read where the inhibition ellipse intersected the scale on the strip.

### **Results:**

Of the 66 organisms tested 7 were resistant to both antibiotics. 59 organisms were sensitive to moxifloxacin and 57 organisms were sensitive to azithromycin. The MIC<sub>90</sub> against *S. aureus* was 0.094 µg/ml for moxifloxacin and >256 µg/ml for azithromycin. The MIC<sub>90</sub> against *Strep viridans* was 0.125 µg/ml for moxifloxacin and 4 µg/ml for azithromycin. The MIC<sub>90</sub> against *H. Influenzae* was 0.47 µg/ml for moxifloxacin and 4 µg/ml for azithromycin. There were too few organisms to calculate MIC<sub>90</sub> for *Strep pneumoniae*.

### **Conclusions:**

Despite the preferential use of the fluoroquinolone class of antibiotics in ophthalmology over the past decade, moxifloxacin maintains a superior *in vitro* susceptibility profile with far lower MIC<sub>90</sub> values as compared to azithromycin in representative conjunctival strains of *S. aureus*, *S. epidermidis*, *S. viridans*, and *H. influenza*.

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## First Case Report of *Candida Dubliniensis* Endogenous Endophthalmitis

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**Purpose:** To report the first case of *Candida dubliniensis* endogenous endophthalmitis in an immunocompetent individual.

**Methods / Case presentation:** 38 year old male with no significant past medical history presented with 8 week-history of pain, redness and gradual decrease in vision in the right eye. He denied trauma, ocular procedures, intravenous drug use, and any systemic symptoms. Social history is significant for working in maintenance at an old school building where the ceiling of his working shop had a leak that was dripping foul liquid from the toilet above. Two months prior to presentation, he also had to drain an abandoned indoor pool that had foul water infested with dead rats.

On presentation, vital signs were normal; visual acuity in the right eye was hand motion and in the left eye was 20/20. Intraocular pressure in the right eye was 5 and in the left eye was 18. On slit lamp exam, right eye had an injected conjunctiva, hypopyon, fluffy white nodules on the iris with no view of the posterior pole. An ultrasound showed vitreous opacity with no retinal detachment. Left eye exam was normal. Patient was immediately taken to the operating room for anterior chamber paracentesis, tap for culture, synechiolysis, pars plana lensectomy, vitrectomy, vitreous culture and intravitreal injection of Vancomycin and Ceftazidime

**Results:** Four days later, the anterior chamber and the vitreous cultures grew *C. dubliniensis* (sensitive to Amphotericin B, Fluconazole, Voriconazole, and Caspofungin). *C. dubliniensis* was initially identified with the commercial yeast identification system VITEK 2ID-YST and the no growth pattern at 45 degrees. This was confirmed by PCR at the New York State Department of Health Wadsworth Center for Lab & Research Mycology Laboratory. Patient was treated by an intravitreal injection of Amphotericin B, topical Amphotericin B, and systemic Voriconazole 200 mg PO Q12hour. He also underwent a thorough work-up for a primary source by an infectious disease specialist. No signs of systemic infection or immunocompromise could be found.

**Conclusions:** *C. dubliniensis* is a novel *Candida* subspecies that was first reported in oral candidiasis of HIV-infected individuals in 1995. This is the first case report of *C. dubliniensis* endogenous endophthalmitis in an immunocompetent individual. *C. dubliniensis* is closely related phylogenetically to *C. albicans*, but it is important for ophthalmic microbiology laboratories to be aware of its presence and to be able to properly differentiate it from *C. albicans*.

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## Anterior Segment Optical Coherence Tomographic Imaging of Post-Infectious Corneal Opacities

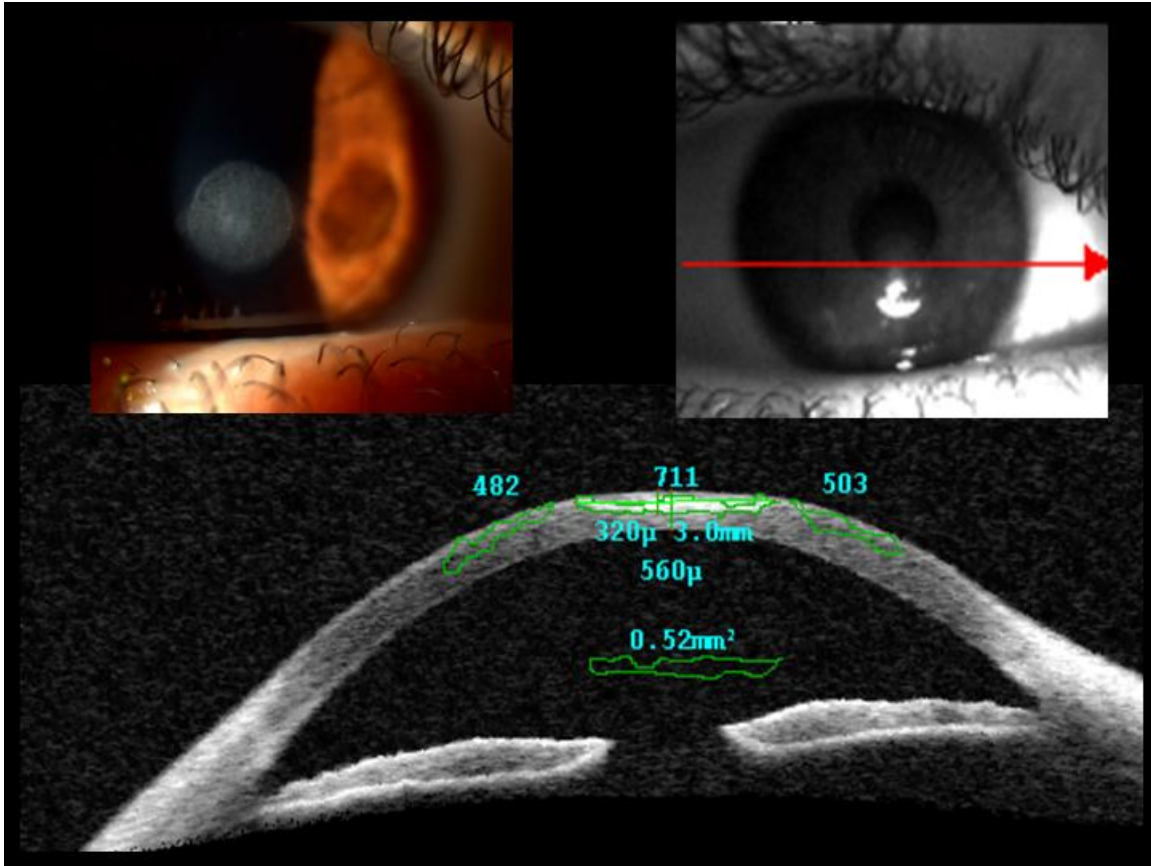
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**Abstract: Purpose:** To evaluate the utility of anterior segment optical coherence tomography (AS-OCT) in the *objective assessment* of post-infectious corneal opacities.

**Methods:** A prospective pilot study of 5 patients with post-infectious corneal opacities previously treated with antibiotics at the New York Eye & Ear Infirmary General Clinic was carried out. A complete chart review including antibiotic and steroid use was performed. Lesion slit lamp photography, AS-OCT (Ophthalmic Technologies Inc. [OTI], Toronto, Canada), and ultrasonic pachymetry was carried out for each patient. Vertical and horizontal clinical measurements were evaluated. Software provided with the AS-OCT machine was used to measure lesion vertical and horizontal dimensions, lesion thickness, corneal thinning, central corneal thickness, and reflectivity (scar and normal adjacent cornea). Photographs were subjectively ranked by a blinded observer for scar density and compared to the AS-OCT scar reflectivity values (Figure 1: Representative photo and AS-OCT image with measurement values).

**Results:** All scars resulted from culture positive, soft contact lens-related corneal ulcers that were successfully treated with antibiotics. Lesion reflectivity averaged 710 units and normal corneal reflectivity averaged 535 units. Average lesion thickness was 457 $\mu$ m (pachymetry) and 552 $\mu$ m (OCT) and vertical length was 3.0mm (slit lamp) and 3.5mm (OCT). Subjective scar density on photography correlated well with corneal OCT reflectivity measures.

**Conclusions:** Anterior segment OCT is a novel imaging modality for post-infectious corneal opacities which can provide an *objective measure of corneal reflectivity* that correlates well with lesion density on photography. Because OCT provides an objective reflectivity value, it can be used to quantify post-infectious corneal opacities and their response to controversial medical therapies intended to decrease scarring such as steroids. Further study will be necessary to determine if the differences in lesion thickness, and lesion height and width are the result of measurement error or some other factor.



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## **Conjunctival Contamination of Vitreous in Pars Plana Vitrectomy**

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**Purpose:** Conjunctival contamination can be present in vitreous fluid obtained by pars plana vitrectomy (PPV) and can sometimes be misdiagnosed as metastatic cancer. The aim of this study was to compare the frequency of conjunctival contaminants in 20, 23 and 25 gauge (G) pars plana vitrectomy specimens.

**Methods:** One hundred and forty three vitrectomy specimens ( fifty-one 20G, fifty-one 25G and forty-one 23G) were selected from the New York Eye and Ear Infirmary Pathology Database between April 2007 and April 2008. Patients who had combined procedures such as scleral buckles or other anterior segment surgeries (e.g. cataract extraction, glaucoma implants) were excluded. The vitreous specimens were reviewed by 3 masked examiners for the presence of surface epithelium. Its presence was then correlated with the surgeon involved and the trocar-gauge used during the surgical procedure.

**Results:** Conjunctival contamination was both surgeon and trocar-gauge independent and was observed in 4 (7.8%) 20G, 1(1.9%) 25G and none of the 23G samples. The contaminants appeared as segments of surface epithelium or as discohesive cells

**Conclusions:** It is important for both pathologists and ophthalmologists to be aware that while rare, conjunctival contaminants can be observed in PPV fluid. Conjunctival contamination is both physician and trocar-gauge independent.

## Slit-lamp Adapted Optical Coherence Tomography (SL-OCT) of Schlemm's Canal after Canaloplasty

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**Purpose:** Canaloplasty is a nonpenetrating glaucoma surgical procedure during which a tensioning polypropylene suture is used to permanently dilate Schlemm's canal and distend the trabecular meshwork to increase aqueous humor outflow. We assessed the ability of SL-OCT, a non-contact, infrared light-based technology, to show canalicular dilation and meshwork distension after canaloplasty.

**Methods:** Six eyes of 5 consecutive patients underwent uncomplicated canaloplasty (3 combined with clear corneal phacoemulsification with lens implantation). Preoperative and postoperative intraocular pressures (IOP) were recorded. All eyes were imaged with SL-OCT post-operatively. Radial SL-OCT images were obtained at 1:30, 3, 4:30, 6, 7:30, 9:00, 10:30, and 12:00 o'clock positions. All images were reviewed by 2 experienced masked observers.

**Results:** After average follow-up period of  $5.5 \pm 1.0$  months (range 4.3 to 7.1 months), in 5 out of 6 eyes, canaloplasty ( $\pm$  cataract extraction) was successful at lowering IOP. Mean IOP decreased from  $21.2 \pm 9.5$  mmHg on  $3.3 \pm 0.5$  topical medications preoperatively to  $17.3 \pm 12.4$  mmHg on  $0.3 \pm 0.8$  topical medications at last follow-up. SL-OCT images showed canalicular dilation in 3/6 (50%) cases and trabecular distension in 5/6 (83.3%) cases. The only eye in which IOP was uncontrolled at the time of last follow-up had no canalicular dilation or trabecular distention visible on SL-OCT.

**Conclusions:** SL-OCT is a useful modality for visualizing Schlemm's canal and trabecular distension in the postoperative period after canaloplasty. Additional larger, controlled studies to demonstrate a relationship between canalicular dilation and meshwork distension and IOP are needed.

# The Microbiologic Spectrum of Corneal Foreign Bodies

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**Purpose:** To determine the incidence of microbial contamination and etiologic organisms from removed corneal foreign bodies.

**Background:** Superficial corneal foreign bodies are a frequent cause of ocular injury. After removal, treatment with empiric antibiotics is common. Previous studies have demonstrated 14.3% to 32.7% culture positivity with coagulase-negative *Staphylococcus* being the most common isolated microorganism.

**Methods:** In this IRB approved prospective observational study, we reviewed the microbiologic records of nonconsecutive corneal foreign bodies removed over 14 months at the New York Eye and Ear Infirmary. All foreign bodies were removed from the cornea using sterile technique and directly placed in thioglycolate broth and incubated at 37° C for 7 days. Turbidity was assessed daily. If turbidity was noted, Gram stain and subculture on standard media was performed. Microbial identification and sensitivities were performed on the Vitek 2 (BioMerieux, Durham, NC).

**Results:** Corneal foreign bodies were removed from the eyes of 55 patients. The average patient age was 40+/-11.3 years. 96.4% of patients were male. Cultures were positive in 47 of 55 (85.45%) cases, and 5 of 55 cases (9.09%) were polymicrobial. No more than 2 organisms were isolated from an individual foreign body. Organisms isolated included *Staphylococcus epidermidis*, *Staphylococcus aureus*, coagulase-negative *Staphylococcus*, *Streptococcus viridans* and *Propionibacterium acnes*. Less frequent isolates included *Staphylococcus warneri*, *Acinetobacter baumannii*, *Corynebacterium*, *Proteus mirabilis*, *Staphylococcus hominis* and *Aspergillus fumigatus*. Isolates were frequently resistant to penicillin G, erythromycin, clindamycin and cefazolin. Sensitivity to gentamicin and fourth generation fluoroquinolones (95.74%) was high. All bacterial isolates were sensitive to vancomycin, rifampin and linezolid.

**Conclusions:** Corneal foreign bodies are frequently contaminated. The current study demonstrates a higher incidence of corneal foreign body culture positivity than previously reported. Most commonly, these foreign bodies are contaminated with bacterial organisms of *Staphylococcus* and *Streptococcus* species. The *in-vitro* antibiotic susceptibility profiles of organisms isolated from superficial corneal foreign bodies suggest prophylaxis with commercially available gentamicin, moxifloxacin, or gatifloxacin would serve as an effective agent in preventing keratitis.

# **Trabectome® in the Surgical Management of Uveitic Glaucoma**

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## **PURPOSE:**

To evaluate the efficacy and safety of Trabectome® surgery in patients with uveitic glaucoma.

## **METHODS:**

A retrospective analysis was performed on 10 patients (12 eyes) who underwent Trabectome® surgery for secondary-open angle glaucoma associated with anterior uveitis between October 2006 and September 2007. Main outcome measures included visual acuity, intraocular pressure (IOP), and complications including hypotony.

## **RESULTS:**

Mean age was  $40 \pm 23$  years (range 16-85 years). The mean follow-up period was  $159 \pm 108$  days (range 22-394 days). Three patients had undergone prior eye procedures including trabeculectomy (n=2) and laser trabeculoplasty (n=1). Trabectome surgery and phacoemulsification were performed simultaneously in 3 patients. Post-operative visual acuity was within 2 lines of pre-operative visual acuity at most recent follow-up for 11 out of 12 eyes. Mean post-operative IOP ( $13.0 \pm 4.6$  mmHg; range 6-20 mmHg) was lower than mean pre-operative IOP ( $28.7 \pm 7.7$  mmHg; range 14-39 mmHg). Successful post-operative IOP control, defined as IOP between 5 and 22 mmHg, was achieved in 10 eyes with a reduction in the mean number of topical glaucoma medications ( $4.2 \pm 0.79$  medications to  $2.6 \pm 1.8$  medications).

## **CONCLUSIONS:**

As a minimally invasive procedure, Trabectome surgery appears to be safe and effective in controlling IOP in patients with open-angle glaucoma associated with uveitis. Further investigation is necessary to assess the long-term efficacy of Trabectome surgery in this specific population.

# The Role of Mast Cells in Thyroid Eye Disease.

## Authors:

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## Purpose:

To compare the number of mast cells found in orbital fat tissue samples of thyroid eye disease (TED) patients versus gender and age matched controls. Mast cells have been implicated in playing an important role in the inflammatory process in thyroid eye disease (TED)<sup>1-7</sup>. Treatment with mast cell inhibitors has been shown to reduce the symptoms of TED<sup>8</sup>.

## Method:

The study was approved by NYEEI ethics committee. Review of the NYEEI pathology database from January 1990 to July 2007 identified 33 orbital fat decompression specimens from patients with TED and 19 blepharoplasty specimens from age-matched controls. Two pathologists counted the number of mast cells under 20x in 10 high-power-fields in a masked fashion. Data was analyzed using the Mann-Whitney test and the conventional t-test.

## Results:

- Number of mast cells in control samples:
  - mean=14.71, sd=10.61, and median=11.0
- Number of mast cells in the TED samples:
  - mean=11.71, sd= 7.89, and median=10.0
- Mann Whitney test (Non-parametric): p=0.3416
- A greater number of degranulated mast cells were observed in the TED samples vs. controls.

## Discussion:

- There is no significant difference in the number of mast cells found in TED patients versus controls.
- Mast cells participate in both acute and chronic inflammation. They bind IgE and recognize antigen, leading to the release of mediators such as histamine and leukotrienes.
- Mast cells have been observed in some animal models of TED. *In vitro*, mast cells have been shown to induce prostaglandin synthesis and GAG production in human orbital fibroblasts<sup>9,10</sup>. Furthermore, the expression of histamine and leukotrienes by degranulating mast cells may partially explain some of the

- characteristic clinical and histopathologic findings in TED including lid retraction, vascular congestion, fibrosis and mucopolysaccharide deposition<sup>8,11</sup>.
- Treatment with monteleukast and cetirizine has been shown to alleviate the symptoms of TED<sup>8</sup>.
  - Prior studies focused on active inflammation. However, orbital fat decompressions are performed in patients with stable, chronic disease. The results in this study do not contradict prior results and suggest that mast cells may disappear once inflammation has resolved. The results also suggest that mast cell inhibitors such as montelukast may not be effective in patients with chronic, stable orbitopathy.

**Conclusions:**

- Further study with greater study power may be needed to show a significant difference and the role of degranulated versus intact mast cells needs to be clarified.
- Our study failed to show a significant increase in mast cell content of orbital fat removed from TED orbits during fat decompression when compared to fat removed from normal subjects during blepharoplasty.

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## Post Operative Refractive Change in Patients After Descemet-Stripping Automated Endothelial Keratoplasty.

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**Purpose:** To evaluate the post-operative refractive change in patients after Descemet-Stripping Automated Endothelial Keratoplasty (DSAEK).

**Methods:** We performed a study of 38 eyes that underwent DSAEK as a primary procedure for pseudophakic bullous keratopathy (PBK) or Fuch's endothelial dystrophy without simultaneous phacoemulsification or intraocular lens implantation at the New York Eye and Ear Infirmary or Long Island Jewish Medical Center from January 2006 to June 2007. Best-corrected visual acuity (BSCVA), and spherical equivalent refraction were assessed at the  $\geq 2$  month postoperative visit and compared with preoperative values with paired student t tests. A significant refractive shift was considered as  $\pm 0.5$  diopter change.

**Results:** BSCVA was 20/150 preoperatively and 20/60 postoperatively ( $p < 0.001$ ). After DSAEK 33 eyes (87%) showed improved BSCVA. The average preoperative spherical equivalent refractive error was  $-1.50 \pm 2.4$  D (range  $-9.50$  to  $+1.38$ ) compared with  $+0.02 \pm 2.0$  D (range  $-5.63$  to  $+3.75$ )  $p = 0.003$  post-operatively. 26 of 38 patients (68%) had a mean hyperopic shift of  $+2.69 \pm 2.45$  D (range  $+1.00$  to  $+6.25$  diopters). 7 of 38 patients (18%) had a mean myopic shift of  $-1.63 \pm 1.46$  D (range  $-1.125$  and  $-6.125$  diopters). 5/38 patients (13%) had a non-significant refractive change (less than  $\pm 0.5$  diopter change).

**Conclusions:** In our DSAEK series for PBK and Fuch's endothelial corneal dystrophy patients, improvement of visual acuity was achieved in a majority of patients with a trend towards hyperopic shift greater than reported in previous series of patients.

## Central Corneal Thickness in Eyes with Optic Disc Drusen

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**Keywords:** neuro-ophthalmology: optic nerve

**Purpose:** The etiology of optic nerve drusen (ODD) is not clearly understood. A leading hypothesis is that eyes with ODD have a small scleral canal. [1,2] A recent study found that in primary open angle glaucoma patients central corneal thickness (CCT) is inversely correlated to optic disc area. [3] The purpose of this study is to evaluate CCT in patients with ODD.

**Methods:** Central corneal thickness was measured by means of ultrasound pachymetry in patients with a diagnosis of ODD (n=19 patients; 37 eyes) and a control population of healthy subjects (n=26 subjects, 50 eyes). All ODD were visible on clinical examination and/or by B-scan ultrasonography and none of the subjects involved in this study had history of ocular surgery. Measurements of CCT were compared by means and population distribution analysis.

**Results:** When both eyes were eligible only the right eye of each individual was analyzed. Mean age was  $65 \pm 9$  (ODD) and  $51.0 \pm 11$  (controls) years. All subjects were white. The average refractive error was  $-2.01 \pm 5$  (ODD) and  $-0.55 \pm 2$  (Controls) diopters. A statistical difference was noted ( $p=0.034$ , independent sample t test) between the mean ( $\pm$  SD) CCT of both groups (Controls  $556.23 \pm 29.22$   $\mu\text{m}$ ; ODD  $581.32 \pm 42.49$   $\mu\text{m}$ ). A trend towards thicker corneas in the ODD group was found ( $p=0.016$ , chi-square test for trend). Distribution analysis of CCT measurements noted the largest cluster of ODD patients around 590 to 610  $\mu\text{m}$ , whereas the largest cluster of control subjects was between 540 and 560  $\mu\text{m}$  (Figure).

Figure: Distribution analysis of central corneal thickness in  $\mu\text{m}$  between ODD eyes (dashed line) and control eyes (continuous line); 20- $\mu\text{m}$  bin range.

**Conclusions:** Optic disc drusen patients have thicker central corneal thickness measurements than controls. 1. Jonas et al Int Ophthalmol (1985); 2. Mullie et al. AJO (1985); 3. Pakravan BJO (2007).

**Commercial Relationship:** T.M. Grippo, None; S. Sandler, None; S. Dorairaj, None; C. Tello, None; J.M. Liebmann, None; R. Ritch, None.

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# **Pars Plana Vitrectomy with Subretinal tPA, Air Fluid Exchange And Gas Injection In The Treatment Of Acute Subretinal Hemorrhage**

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**Purpose:** To review eight cases of acute subretinal hemorrhage successfully treated with pars plana vitrectomy, subretinal tPA, air fluid exchange and gas injection.

**Methods:** Retrospective chart review of eight consecutive patients, ages 24 to 87, with acute subretinal hemorrhage that was present for four weeks or less. The causes were exudative age related macular degeneration in five, choroidal neovascularization secondary to toxoplasmosis in one, pathologic myopia in one, and blunt trauma in one. In four cases the subretinal hemorrhage extended beyond the vascular arcades, and in the remaining four, the hemorrhage was two to three disc diameters in size and was contained within the arcades. In all cases, pars plana vitrectomy, subretinal injection of 0.1cc of tissue plasminogen activator, air fluid exchange and gas injection was performed to allow pneumatic displacement of the subretinal hemorrhage.

**Results:** The subretinal hemorrhage was successfully displaced from the macula in all eight cases. The vision improved from hand motions to 20/40, 20/200 to 20/40, counting fingers to 20/100, counting fingers to 20/150, and 20/100 to 20/50 in five cases. The remaining three cases had pre-operative subfoveal scarring, thus showed only a slight improvement from counting fingers vision to 20/400 in one case and no improvement from 20/400 and hand motions vision, respectively, in the other two cases. However, all three patients noted a subjective improvement in their vision due to the decrease in submacular hemorrhage surrounding the central scars.

**Conclusions:** Pars plana vitrectomy with subretinal tPA, air fluid exchange and gas injection is a safe, effective way to displace acute subretinal hemorrhage from the macula and improve vision.

## Whole Body <sup>18</sup>FDG PET-CT Imaging of Systemic Sarcoidosis

**Julia Shulman, Paul Latkany, Kim Chin, Paul T Finger**

*From The New York Eye Cancer Center and The New York Eye and Ear Infirmary, New York City, New York, USA.*

**Purpose:** To describe systemic sarcoidosis lesions revealed through whole body <sup>18</sup>Fluorodeoxyglucose positron emission tomography / computed radiographic tomography (PET/CT) imaging.

**Methods:** We performed a retrospective review of 4 ocular tumor patients evaluated with PET/CT for metastatic disease. Each either had a history or were diagnosed with systemic sarcoidosis. Two were under treatment for conjunctival melanoma and 2 presented with atypical choroidal tumors. We used PET/CT to stage each patient. PET/CT images were studied for presence of increased <sup>18</sup>-FDG concentration. Elevated standardized uptake values (SUV) typically  $\geq 2.5$  were considered positive. High SUV levels indicate increased metabolism (glucose consumption).

**Results:** In all cases, PET-CT revealed increased systemic <sup>18</sup>-FDG uptake with SUV values ranging from 1.7 to 5.9. Pt demographics, ocular findings and site of activity are summarized below:

<i>Pt Number</i>	<i>Sex</i>	<i>Age</i>	<i>Ocular Findings</i>	<i>PET-CT Findings (SUV)</i>
1	F	49	Conjunctival melanoma	Multiple mediastinal nodes, R supraclavicular node (5.9)
2	F	64	Conjunctival melanoma	R supraclavicular (3.2) and para-aortic (4.2) nodes, L paratracheal (3.5), distal clavicular (2.0) and paraceliac (7.0) nodes
3	M	23	Choroidal tumor	R superior paratrachial (3.2) and subcarinal (4.0) nodes, ill def opacity in R upper lobe
4	F	56	Choroidal tumor, Eyelid tumor Thigh Tumor	B/l internal jug chain (3.7), gastrohepatic node (3.7), fine nodularity in both lungs, hypermetabolic activity throughout both lower extremities (max SUV of 5.8)

Patients 1 and 2 had a previous diagnosis of sarcoidosis (without clinically apparent ocular involvement); while patients 3 and 4 were newly diagnosed. PET/CT is shown to reveal the presence and distribution of clinically apparent and occult sarcoid granulomas.

**Conclusions:** PET/CT is a powerful imaging modality for staging ocular and nonocular cancers. It has been found to detect synchronous non-ocular primary cancer. In this series, PET/CT was helped for staging of systemic sarcoidosis.

## **Efficacy of subconjunctival bevacizumab injection in primary and recurrent pterygia**

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**Purpose:** To report the efficacy of subconjunctival bevacizumab injection in regression of vascularity of primary and recurrent pterygia.

**Methods:** This prospective pilot study included 20 eyes of 19 patients that were stratified into two groups. Patients in the treatment group received bevacizumab 1.25mg/0.05ml injected subconjunctivally into the pterygium adjacent to the limbus. Patients in the control group were treated with topical steroids for recurrent pterygia and lubrication for primary pterygia. Slit lamp photos were taken prior to treatment and at two and four weeks intervals after initiation of treatment. Pterygia were evaluated photographically by two independent, blinded cornea specialists and graded on a 0 to 10 scale of increasing vascularity.

**Results:** The baseline mean vascularity score between the treatment and control groups were not statistically significantly different ( $p=0.008$ ). Of the 10 eyes that received bevacizumab injections, 70% (7/10) were graded by at least one observer as having less vascularity, 20% (2/10) were graded as having more vascularity and 10% (1/10) had a stable vascularity score at 2 weeks (Figure 4). By 4 weeks, only 43% (3/7) had a vascularity score lower than their pre-injection level. When compared with the control group, there was no statistical difference in vascularity scores or change of vascularity noted at both 2 and 4 weeks after initiation of treatment. No relevant adverse side effects were observed in our series.

**Conclusions:** Initial results show that single injections at a concentration of 1.25mg/0.05ml result in mild transient improvement in vascularity at two weeks. However, by four weeks, there may be worsening of vascularity suggesting that repeat bevacizumab injections may be needed to provide a lasting effect. Further investigation is required to determine whether subconjunctival injection(s) of bevacizumab is of clinical value in the treatment of primary and recurrent pterygium, either in alone or in conjunction with established modes of therapy.

## Do all Meningiomas of the Cavernous Sinus Require Treatment?

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**Background:** With the application of conformal planning conventional dose radiotherapy and high dose radiosurgery to the treatment of meningioma, we are faced with increasing pressure to treat these tumors even when located in areas classically associated with a benign outcome. Since the long-term benefit of these therapies has not been clearly delineated, providing clinical presentation features at baseline and the outcome of untreated patients might be useful in determining which patients should undergo radiotherapy.

**Objective:** To detail demographic, radiographic, and clinical features of patients with meningioma, primarily affecting the cavernous sinus, and look at outcomes of cranial neuropathy, visual loss, central nervous system dysfunction, and tumor growth.

**Methods:** Retrospective review of 67 patients with cavernous sinus meningioma, 36 of whom did not undergo immediate surgery or radiotherapy and were observed by one neuro-ophthalmology service for a mean of 4.5 years (range 1-20). Baseline MRIs were given 1 grade for each tumor extension into the suprasellar cistern, orbit, prepontine cistern, and 1 grade for cavernous sinus involvement.

**Results:** 52 women (77.6%) and 15 men (22.4%), mean age 57.2 years, presented with diplopia in 39, headache or head pressure in 8, blurred vision in 3, or facial paresthesias in 6. Clinical findings included: proptosis in 13(19.4%), CN III in 21 (31.34%), CN IV in 4 (5.97%), CN VI in 34 (50.75%), CN III and VI in 14 (20.9%), CN III, VI, and IV in 3 (4.5%), full EOM in 22 (32.8%), ptosis in 16 (23.9%), normal visual field in 51 (76.1%) and optic neuropathy in 14 (20.9%). No patient had cortical spinal, cerebellar, or cognitive deficits. Review of baseline MRIs of 63 patients revealed extension into the orbit in 15 (23.8%), suprasellar cistern in 29 (46.03%), and prepontine cistern in 25 (39.68%), and narrowing of the cavernous internal carotid artery in 23 (36.5%). The MRI grade was 1, 2, 3, or 4 in 31.3%, 41.7%, 22.9%, and 4.2% of scans respectively.

At the last exam, EOM function was unchanged in 23, worse in 10, and better in 6. The optic neuropathy was stable in 4 and newly developed in 2. Follow-up MRIs during the mean of 3.4 years were in unchanged in 32 and worse in 3.

**Conclusion:** Meningiomas in the cavernous sinus are typically slow growing and many patients can be followed with clinical exams and MRIs prior to prescribing an intervention. Since the benefit of conventional dose radiation may only last 10 years, therapy might be reserved for patients debilitated by the presenting clinical dysfunction or if during the observation, clinical or radiographic worsening can be determined. At presentation, the tumor is frequently large or too close to the optic apparatus to safely use radiosurgery.

## **Title: Effects of Eye Color on Selective Laser Trabeculoplasty**

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**Purpose:** To examine the effect of eye color on Selective Laser Trabeculoplasty (SLT), to decrease intraocular pressure (IOP) in patients with glaucoma.

**Methods:** Retrospective chart review was performed on 144 of 2008 eyes treated with SLT over 5 years. Eyes were grouped as: blue and brown. Two-tailed paired t-test and ANOVA were used to compare maximum pre- and post-procedure IOP.

**Results:** Mean follow-up was 377 days. After SLT, mean IOP decreased 26% in blue eyes and 32% in brown eyes. Results were significant with  $p < 0.05$ .

**Conclusion:** In this series, SLT significantly lowered mean IOP more in brown eyes and less in blue eyes; suggesting a relationship between eye pigment and post-SLT reduction of IOP in patients with glaucoma.

## **Risk Factors and Means of Detection of *Acanthamoeba* Keratitis at the New York Eye and Ear Infirmary 2005-2007**

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**Purpose:** To determine the risk factors and optimal detection methods for *Acanthamoeba* keratitis at the New York Eye and Ear Infirmary (2005-2007).

**Methods:** The medical records of 23 cases of *Acanthamoeba* keratitis from 2005-2007 were collected. The records were reviewed and the following information was tabulated: patient demographics, medical history, risk factors for *Acanthamoeba* keratitis (including contact lens usage, cleansing solution used, overnight usage, method of cleansing, trauma, etc.), mode of detection, culture media employed, and clinical outcomes.

**Results:** Of the 23 cases, 21 presented after October 2006. Nineteen cases were related to contact lens usage, 3 cases were related trauma, and 1 case was related to contaminated water exposure without lens usage. Of the 2 cases presenting prior to October 2006, 1 case was related to trauma and the other to contact lens usage. Both were diagnosed by corneal pathology sections. Of the cases presenting after October 2006, 11/21 (52.4%) had positive corneal cultures, 10/21 (47.6%) had visible cysts by confocal microscopy, and 17/21 (71.0%) were diagnosed by the combination of cultures and/or confocal microscopy. Six cases were diagnosed by slit exam, history, and response to anti-amoebic therapy alone. All 11 cases with positive cultures were detected after October 2006 after switching culture media from a non-nutrient agar with *E. coli* overlay to one with *Enterobacter aerogenes*. Of the 19 cases related to contact lens usage, 7/19 (37%) used AMO Complete® cleansing solution, 5/19 (26.3%) used Bausch & Lomb Moisture Loc® solution, and 1/19 used both of these solutions. Risk factors included overnight contact lens usage (4/19), exposure to contaminated water (5/19), extended contact lens usage (greater than 12 hours per day) (4/19), and infrequently replenishing solution between contact lens usage (2/19).

**Conclusions:** Our *Acanthamoeba* outbreak began in October of 2006 nearly 18 months after those reported in Philadelphia and Chicago. Corneal culture and confocal microscopy seem to be very effective modes of detection. Switching to an *Enterobacter aerogenes* overlay instead of *E. coli* dramatically improved our culture yield (~50%). There was an association between the type of contact lens solution a patient used and the acquisition of *Acanthamoeba* keratitis.

# Retinal Blood Flow Velocity in Normal Subjects Using The Retinal Function Imager

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**Purpose:** To determine retinal venous blood flow velocity and arterial blood flow velocity in normal subjects using the Retinal Function Imager.

**Methods:** The Retinal Function Imager (RFI) (Optical Imaging, Rehovot, Israel) provides direct visualization and measurement of retinal blood flow velocity. The RFI system is composed of a standard fundus camera to which a customized stroboscopic flash lamp system and a fast digital camera have been added. The blood flow velocity measurement is achieved by the fact that hemoglobin-filled erythrocytes in the bloodstream provide a natural, high contrast chromophore which directly marks the flow of blood. Tracking of these erythrocytes gives a direct measure of their velocity. Eight consecutive flashes with an inter-flash interval of less than 20 msec are delivered to a patient. Sequences of eight frames each are obtained from each patient in the way of standard fundus cameras.

Automated flow velocity quantification is achieved by using a path-constrained cross-correlation technique. Path templates (essentially tracings over the blood vessels to be analyzed) are generated by an experienced operator via a method combining user supervision with automatic detection. The instrument's analysis software provided quantitative analysis of the retinal blood flow characteristics.

We looked at the average blood flow velocities in retinal veins and arteries.

## **Results:**

We studied 54 eyes of 27 normal subjects (normal retinal exams at dilated funduscopy and no other ocular pathology). The average arterial blood flow velocity was 5.2 +/- 1.2mm/sec in the right eye and 5.1 +/- 1.5mm/sec in the left eye. The average venous blood flow velocity was 4.3 +/-1.2mm/sec in the right eye and 4.3 +/- 1.0 mm/sec in the left eye. There was no statistically significant difference between the right and left eye neither for arterial nor venous blood flow velocity ( $p = 0.79$  and  $p = 0.86$  respectively). We also compared average venous and arterial blood flow velocities in males and females. The average arterial blood flow velocity was 4.8 +/- 1.3mm/sec in males and 5.2 +/- 1.5mm/sec in females. The average venous blood flow velocity was 4.2 +/- 1.0mm/sec in males and 4.3 +/- 1.3mm/sec in females. There was no statistically significant difference between males and females neither for arterial nor venous blood flow velocity ( $p=0.32$  and  $p=0.76$  respectively).

**Conclusion:** The Retinal Functional Imager provides a novel non-invasive method for estimating blood flow in the human retina. It measures velocities in secondary and tertiary branches of the major arcade vessels, with diameters between 4 and 40 microns. This method might make it possible to detect circulation changes both in normal subjects and in ocular disorders. The normative values in this study can be used as referral values in future studies of retinal blood flow in pathological states.

# Non-Contact *In Vivo* Confocal Laser Scanning Microscopy Of Exfoliation Syndrome

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Running title: Sbeity / Confocal Microscopy in XFS

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## ABSTRACT

**Purpose:** To visualize structural alterations of the cornea, iris and lens in patients with exfoliation syndrome (XFS) using a non-contact *in vivo* laser scanning confocal microscope and to correlate these with the clinical features.

**Methods:** The cornea, iris and lens of 30 eyes with XFS were imaged using the Rostock Cornea Module of Heidelberg Retina Tomograph II (50x non-contact Nikon lens, an estimated 1-2  $\mu\text{m}$  transverse resolution, field of view: 300 x 300  $\mu\text{m}$ ). Serial transverse section images as well as anterior segment photographs were taken and analyzed.

**Results:** The corneal stroma and endothelium of 19 eyes (63 %) showed different amounts and sizes of scattered small hyperreflective deposits. The irides revealed hyperreflective deposits on the anterior outer surfaces and/or pupillary margin corresponding to exfoliation material (XFM) and/or pigment granules. The anterior lens capsule showed varying degrees of peripupillary fibrillar hyperreflective deposits, hyperreflective areas with apparent epithelial cells centrally, and uniform epithelial cells in the clear intermediate zone. On the anterior capsule in four pseudophakic eyes, XFM appeared as hyperreflective round deposits. Hyperreflective floating deposits were seen in the aqueous humor in the pupillary region of the posterior chamber of six eyes (20%).

**Conclusions:** Non-contact *in vivo* confocal microscopy permits visualization of XFM in the cornea, iris and lens. This new technique may improve early detection of anterior segment abnormalities by providing information about subclinical cellular pathology, such as early pregranular XFS.

# Diagnostic Ability of the High Speed Spectral Fourier Domain Optic Coherence Tomography in Glaucomatous Eyes With Asymmetric Hemifield Defects

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**Purpose:** To evaluate the diagnostic ability of the new imaging protocols of the Spectral Fourier Domain Optic Coherence Tomography (SFD OCT) to differentiate severe from early damage hemifields of glaucomatous eyes with asymmetric hemifield defects, as well the structure function correlation in these eyes

**Methods:** This was an observational prospective cross-sectional study. Thirty glaucoma patients with asymmetric functional damage and twenty-eight age-matched normal controls were enrolled. Asymmetric visual field (VF) examinations were defined by the presence of a cluster of at least 3 non-edge-contiguous test points, not including those directly above and below the blind spot, with  $p < 1\%$ , at least one of which with  $p < 0.5\%$  in the pattern deviation (PD) plot of the Humphrey printout, GHT outside normal limits and the absence of any point with  $p \leq 2\%$  in the opposite hemifield (HF) in the most reliable VF examination. The damaged HFs were classified as severe and the opposite as early. Subjects underwent undilated SFD OCT raster scanning of the optic nerve head (ONH) and macular area using the equipment. In order to assess a continuous variable for each superior and inferior HF, the arithmetic average was calculated using the values of all points in the PD plot of each HF excluding the 2 points immediately above or below the blind spot. The values obtained were called the early and severe PD. Similarly, the values of the superior and inferior PD were calculated in the control group. Areas under ROC curves (AUCs) and Pearson's correlation coefficient were used to evaluate the SFD OCT diagnostic performance and structure-function correlation, respectively.

**Results:** The apparently "normal" HFs of glaucomatous eyes with asymmetric SAP defects showed significantly lower sensitivities than HFs of age-matched healthy individuals. The superior HF was affected in 83.3% of the glaucomatous eyes. Peripapillary and macular RNFL thickness measurements were significantly lower in the advanced and early damaged hemiretinas of glaucomatous eyes than the superior hemiretina of healthy eyes. In the preperimetric (early damage) model the peripapillary RNFL protocol showed best correlation and diagnostic accuracy, while in the perimetric (severe) model the macular protocols showed better correlation and diagnostic accuracy.

**Conclusions:** This study demonstrated that the new imaging protocols of the SFD OCT show different correlation coefficients and diagnostic abilities depending on the level of visual field damage in a model of pre-perimetric and perimetric SAP functional defects in the same eye.

## Normal versus High Tension Glaucoma: A Comparison of Functional and Structural Deficits

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**Purpose:** To compare visual field deficits measured with multifocal visual evoked potential (mfVEP) and Humphrey visual field (HVF) techniques to measurements of optic disc topography in patients with normal tension glaucoma (NTG) and high tension glaucoma (HTG).

**Methods:** Thirty patients with NTG and 32 with HTG were studied. All patients had reliable 24-2 HVFs with a mean deviation (MD)  $\geq$ -10 dB and a glaucomatous optic disc and an abnormal HVF (PSD and/or GHT) in at least one eye. Monocular mfVEPs were obtained from each eye using VERIS (EDI). The stimulus was a pattern-reversal dartboard. The mfVEP responses were analyzed with custom software and monocular probability plots were derived [1,2]. The mfVEP and HVF probability plots were divided into a central 10-deg. (radius) and an outer arcuate area in both hemifields. Cluster analyses and counts of abnormal points were performed in each sub-field [3,4]. Optic disc images were obtained with the Heidelberg Retina Tomograph III (HRT III) and divided into 6 segments. Segments were defined as abnormal compared to a normative database using Moorfields regression analysis.

**Results:** There were no significant differences in MD and PSD values for NTG compared to HTG eyes. However, NTG eyes had a higher prevalence of cluster deficits in the central superior sub-field on both mfVEP and HVF. HTG eyes had a higher prevalence of cluster deficits in the inferior outer arcuate area for HVF. For HRT III there was no significant difference in total rim area, however the nasal segment was abnormal in significantly more HTG than NTG eyes ( $p < 0.05$ ) suggesting more peripheral damage in HTG in areas outside that measured by 24-2 HVF.

**Conclusions:** The combined visual field and HRT data suggest more localized and central deficits for NTG as compared to more peripheral and diffuse deficits for HTG. Ref: 1. Hood et al (2002) AO. 2. Hood and Greenstein (2003) Prog Ret Eye Res. 3. Goldberg et al (2002) AJO. 4. Hood et al (2003) J Glaucoma.

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# Long Lasting Hypotensive Effect Of Juxtasccleral Administration Of Anecortave Acetate In Different Types Of Glaucoma

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**Co-authors:** Ivan M. Tavares; Paulo Augusto A. Mello; Caroline Tamura; Verônica C. Lima; Rubens Belfort Jr.

## ABSTRACT

### LONG LASTING HYPOTENSIVE EFFECT OF JXTASCLERAL ADMINISTRATION OF ANECORTAVE ACETATE IN DIFFERENT TYPES OF GLAUCOMA

**Purpose:** To evaluate the efficacy and safety of anecortave acetate (AA) anterior juxtasccleral depot (AJD) injection to reduce intraocular pressure (IOP) in glaucoma patients. **Methods:** A prospective, non-randomized, open-labeled clinical trial in 28 eyes of 28 uncontrolled glaucoma patients. All received a single AJD of AA (24 - 30 mg) in one selected eye under topical anesthesia. Baseline and post-injection assessments were scheduled at week 1, month 1, month 2, and month 3. **Results:** Mean age of patients was 58.2 ( $\pm$ 18.6) years. There were 12 patients with open angle glaucoma (OAG), 8 with primary OAG and 4 with secondary OAG. With angle closure glaucoma (ACG) there were 16 patients (3 with primary ACG and 13 with secondary ACG). The uveitis / steroid induced glaucoma was the most frequent diagnosis (11 patients, 39.2%). Mean IOP at baseline was 30.7 ( $\pm$  9.3) mmHg and 57.1% of the patients had prior intraocular surgery. Mean IOP at months 1, 2, and 3 were 19.8 ( $\pm$  6.3) mmHg, 20.9 ( $\pm$  7.3) mmHg and 21.7 ( $\pm$  6.8) mmHg, respectively. Mean IOP reduction at months 1, 2, and 3 were 33.8%, 30.1% and 27.2% respectively. At month 3, angle closure glaucoma eyes had a mean IOP of 22.5 mmHg (reduction of 34.6%) while open angle glaucoma eyes had a mean IOP of 20.8 mmHg (reduction of 16.7%). Administration was painless and without any intercurrents. A mild subconjunctival hemorrhage was observed in four cases and one eye developed a small and transient corneal dellen. **Conclusion:** A single administration of Anecortave Acetate by AJD demonstrates a significant IOP reduction for at least three months ( $p=0.0001$ ) with no clinically apparent serious adverse events in eyes with different types of glaucoma.

# The Effect of Iridoplasty on the Iridocorneal Angle in Plateau Iris Syndrome Imaged by Anterior Segment Ocular Coherence Tomography

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**Purpose:** To assess the iridocorneal angle in patients with plateau iris syndrome (PIS) before and after argon laser peripheral iridoplasty (ALPI) using slit-lamp-adapted ocular coherence tomography (SL-OCT).

**Methods:** Eyes with PIS and prior laser iridotomy underwent circumferential ALPI. Laser parameters were: 500  $\mu\text{m}$  spot size, 0.5-0.7sec, 190-360mW and a total of 24-58 burns. Vertical and horizontal cross-sectional angle images were taken in dark and light room conditions before and 3-12 weeks after ALPI using SL-OCT (Heidelberg Engineering, Germany). Anterior chamber angle (ACA), angle opening distance (AOD) and trabecular iris surface area (TISA) at 500 $\mu\text{m}$  and 750  $\mu\text{m}$  anterior to the scleral spur were analyzed and compared before and after ALPI.

**Results:** Fifteen eyes of twelve patients (mean age,  $62.0 \pm 10.4$  yrs; range 43-78 yrs; 9 women, 3 men) were enrolled. The anterior chamber angle widened in all eyes after ALPI (mean values pre/post-laser: ACA 500 $\mu\text{m}$  ( $^\circ$ ):  $10.9 \pm 4.99 / 20.43 \pm 3.37$ ,  $p=0.0007$ ; AOD 500 $\mu\text{m}$  (mm):  $0.114 \pm 0.043 / 0.192 \pm 0.047$ ,  $p=0.0015$  and TISA 500 $\mu\text{m}$  ( $\text{mm}^2$ ):  $0.044 \pm 0.020 / 0.077 \pm 0.019$ ,  $p=0.0015$ ; Wilcoxon signed-rank test).

**Conclusion:** SL-OCT can be used for non-invasive, quantitative assessment of the anterior chamber angle before and after iridoplasty and could be used to measure ICA parameters in studies of laser treatment for angle-closure.

Supported in part by the Joseph Cohen Research fund of the New York Glaucoma Research Institute, New York, NY, and the Educational Foundation of America, Westport, CT

# **Retrospective Comparative Study to Evaluate the Safety and Efficacy of Intravitreal Injections of Bevacizumab (Avastin) versus Ranibizumab (Lucentis) in Treatment of Patients With Exudative Form of AMD**

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## **Purpose**

To compare safety and efficacy of two anti-vascular endothelial growth factor agents - bevacizumab (Avastin) versus ranibizumab (Lucentis) - in the treatment of patients with exudative form of age-related macular degeneration (AMD).

## **Material and methods**

Retrospective review of medical charts of patients who received injections at monthly intervals of intravitreal Avastin or Lucentis for exudative AMD. Primary outcome measures were: change in best-corrected visual acuity (BCVA), central macular thickness assessed by Scanning Laser Ophthalmoscope-Optical Coherence Tomography (SLO-OCT) and screening for adverse events.

## **Material and methods**

Retrospective review of medical charts of patients who received injections at monthly intervals of intravitreal Avastin or Lucentis for exudative AMD. Primary outcome measures were: change in best-corrected visual acuity (BCVA), central macular thickness assessed by Scanning Laser Ophthalmoscope-Optical Coherence Tomography (SLO-OCT) and screening for adverse events.

## **Results and observations**

- Thirty-three eyes were included in Avastin Group and 31 eyes in Lucentis Group.
- The number of injections was 163 in Avastin group (average of 4.9 per eye) and 165 in Lucentis Group (average of 5.3 per eye).
- The baseline mean LogMAR BCVA was 0.90 (Snellen equivalent of 20/200) and 0.92 (Snellen equivalent of 20/200) in Avastin and Lucentis group, respectively.

- The mean logMAR best-corrected visual acuity improved by 0.14 in Avastin Group and by 0.15 in Lucentis Group.
- The average SLO-OCT central foveal thickness reduced from 350 microns at baseline to 332 microns at the final follow-up in Avastin Group and from 282 microns at baseline to 265 microns at the final follow-up in Lucentis Group.

Adverse affects related to the injections were as follows. In Avastin Group - one patient had lower extremety pain (thromboembolic event has been ruled out by US Doppler exam). In Lucentis Group - two patients had transient event of increased intraocular pressure.

### **Conclusions**

Intravitreal Avastin injections appear to be as effective and safe as intravitreal injections of Lucentis in the treatment of exudative AMD, and result in similar gain in visual acuity and similar reduction in macular thickness. Further clinical trials with a larger population are required to evaluate the long-term visual outcomes and complication profiles of treatment with such medications.

## **Intraocular Lens Power Calculation in Eyes with Posterior Staphyloma; Aphakic Refraction Technique**

Richard J. Mackool MD, Sabrina Nicolich BS, Richard Mackool MD

**Purpose:** To evaluate the accuracy of the aphakic refraction technique to calculate intraocular lens (IOL) power for eyes with posterior staphyloma undergoing cataract extraction.

**Setting:** Clinical private practice and ambulatory surgery center, Astoria, NY, USA.

**Methods:** This retrospective study was of 100 eyes of 65 patients who presented for cataract extraction and were found to have ultrasonographic evidence of posterior staphyloma. Cataract removal was performed under topical anesthesia without IOL implantation. Approximately 30 minutes later, a manifest refraction was performed and used to calculate the IOL power required by applying an algorithm derived from previous experiences with secondary IOL implantation (Mackool Algorithm). The patient then returned to the operating room for lens implantation (aphakic refraction technique).

**Results:** The mean absolute refractive error at two weeks postoperatively, defined as the difference between the intended and actual refractive outcome was 0.69 D. Fifty-five percent of eyes had a mean postoperative refractive error of 0.50 diopters or less, and 89% of eyes had a postoperative refractive error of 1.0 diopters or less.

**Conclusions:** The aphakic refraction technique provided an accurate postoperative refraction in eyes with posterior staphyloma having cataract with IOL implantation surgery. The results were not as accurate, however, as those previously reported by us when using the same technique in patients who had undergone previous Lasik and who did not have posterior staphyloma.

## Whole-body PET-CT in the Staging and Post-Radiation Therapy Surveillance of Orbital Mucosa-Associated Lymphoid Tissue (MALT) Type Marginal Zone B-cell Lymphoma

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### **Background:**

Mucosa-associated lymphoid tissue (MALT) type marginal zone B-lymphomas comprise 40-60% of orbital lymphomas. Previously, it has been reported that 50% of these tumors will develop systemic disease at 10 years. Because of the indolent nature of MALT lymphomas, it has been suggested that PET-CT is not useful for staging and surveillance. However, in clinical series comprised of 4-7 cases, PET-CT has identified rates of systemic metastases as high as 50-57% at presentation. This case series reviews 19 cases of MALT lymphomas to clarify the usefulness of PET-CT in staging and post-radiation therapy surveillance, stratified according to sites of involvement.

### **Methods:**

19 patients who had biopsy-proven orbital MALT lymphoma underwent hybrid whole-body F<sup>18</sup>-fluoro-deoxyglucose PET-CT. 8 of the patients underwent post-radiotherapy scans after receiving a mean dose of 30.6 Gy in seventeen 180cGy fractions. Standard uptake value (SUV) maximum threshold was 3.0. There were 11 conjunctival lesions; 5, eyelid; 3, orbital; 2, lacrimal gland; and 1, mixed. Four patients had bilateral lesions.

### **Results:**

Table 1. Primary lesion detection by PET-CT

Location of Orbital Lymphoma	Median SUV of Primary Lesion	Sensitivity	Specificity	PPV	NPV
Eyelid	3.2 (2.2-3.8)	60%	20%	75%	67%
Conjunctiva	2.6 (1.6-3.7)	27%	33%	60%	33%
Lacrimal	6.4 (5.3-7.5)	100%	100%	50%	0%
Orbital	2.7 (2.6-6.6)	33.3%	66.7%	33.3%	33.3%
Mixed	4.9	100%	0%	100%	100%

Table 2. Systemic involvement found on PET-CT Therapy

Location of Orbital Lymphoma	SUV of Peripheral LN	Location of Systemic Involvement	LN	Biopsy
Eyelid-unilateral	7.8, 17.5, 4.6	Local/Regional-ipsilateral→IIAE	Facial, Parotid, Jugula	+
Conjunctiva-bilateral	3.1	Local	Facial	-
Lacrimal-unilateral	10.4	Distant→IIIAE	Para-caval	+

Table 3. Response to Radiation

Location of Orbital Lymphoma	Median SUV before treatment	Median SUV after treatment	Median follow-up time (months)
Eyelid- 2 cases	3.6 (3.4-3.8)	3.1 (2.2-4)	5.5 (3-8)
Conjunctival- 5 cases	3.2 (2.1-3.7)	2.7 (1.6-2.8)	5 (4-67)
Lacrimal- 1 case	7.5	10.1	22
Orbital-2	2.7	3.0	16

cases	(2.6-2.7)	(2.6-3.3)	(13-19)
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**Conclusions:** PET-CT is a poor modality for assessing most primary MALT lymphoma lesions, especially after biopsy. However, it was highly effective for detecting systemic spread of disease. A lower incidence of metastasis (2 out of 19 cases) was found in this case series as compared to the literature. The efficacy of radiation therapy was demonstrated by decreased tumor-related metabolic activity (SUV) in the conjunctival cohort.

## Melatonin levels in age-related macular degeneration patients as measured by urinary 6-sulfatoxymelatonin level

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### Abstract

**Purpose:** Melatonin, an endogenous neurohormone produced by the pineal gland and the retina, is a potent antioxidant and free radical scavenger, and can suppress abnormal upregulation of VEGF by RPE cells. The purpose of the present study was to compare peak melatonin levels in age-related macular degeneration (AMD) patients and normal controls. In order to capture peak melatonin levels, which occur late at night, and avoid the need for hospitalization, in order to collect properly timed blood specimens, melatonin levels were determined by measuring urinary 6-sulfatoxymelatonin (the main metabolite of melatonin) level, which correlates well with the melatonin level in the blood.

**Methods:** The first urine of the morning was collected from 20 AMD patients (10 cases of dry type and 10 cases of wet type) and gender/age matched 10 normal controls. Subjects were carefully screened to exclude individuals on confounding medications or with confounding genito-urinary conditions or ocular conditions and instructed to refrigerate specimens at home as soon as collected. Specimens were stored under -70 C until measurement which was performed in batch. Level of 6-sulfatoxymelatonin in specimens was measured by a commercial 6-sulfatoxymelatonin ELISA kit (ALPCO Diagnostics, Windham, NH).

**Results:** The levels of urine 6-sulfatoxymelatonin (mean  $\pm$  SD) in dry type AMD, wet type AMD, and normal control were  $7.1 \pm 5.8$ ,  $8.3 \pm 9.3$  and  $12.2 \pm 9.7$  ng/ml, respectively. In spite of apparent reduced average levels in the AMD groups, Student t-test analysis showed a non-significant difference between the normal control and the AMD groups ( $P = 0.11$ ).

**Conclusions:** Urine 6-sulfatoxymelatonin levels in AMD patient measured 30- 40% lower than those of normal controls. This difference between AMD and control subjects, however, was not statistically significant, perhaps due to the relatively small sample size. Currently, recruitment is ongoing to enlarge the subject pool in the hope of clarifying melatonin level differences which may help to reveal its possible role in the pathogenesis of AMD.

## **Tumor location affects the incidence of cataract and retinopathy after ophthalmic radiation therapy: An analysis of 384 consecutive cases.**

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Purpose: To examine how tumor location affects ocular morbidity after ophthalmic plaque radiotherapy with <sup>103</sup>Pd for uveal melanoma.

Methods: 384 eyes were irradiated and followed for a mean 47.2 months. There were 122 anterior uveal melanomas and 233 were posterior to the equator. The number of patients in each staging classification was as follows: T1 (69), T2 (293), T3 (17), T4(4). The mean apical dose for all tumors was 71.2 Gy.

Results: Only 18 (15%) of the patients plaqued for an anterior uveal melanoma developed secondary retinopathy. In contrast, 130 (56%) of the posterior choroidal melanoma patients developed retinopathy (p value <0.001). The odds ratio for retinopathy was 0.137 if the tumor was located anteriorly. Cataract developed in 37 (30%) eyes with phakic anterior tumors compared with 28 (12%) eyes with posterior tumors (p value <0.001). The odds ratio for a cataract was 3.186 if the tumor was located anteriorly. Out of 384 treated patients, 291 (75.8%) retained 20/200 or better vision.

Conclusion: While plaque radiation of anterior melanomas is more likely to cause reversible vision loss secondary to cataract, treatment of posterior tumors is more likely to be associated with radiation retinopathy.

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# Dynamic Non-Contrast Imaging of Occult Retinal Collateral Circulation Patterns Using the Retinal Functional Imager (RFI)

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**Purpose:** To describe different patterns of retinal collateral circulation observed in normal subjects and in patients with different ocular diseases using the Retinal Functional Imager (RFI).

**Methods:** Normal subjects and patients with ocular disease referred to the Retina Center of The New York Eye & Ear Infirmary were imaged with the RFI (Optical Imaging, Ltd, Rehovot, Israel) to characterize dynamic blood flow parameters and study microcirculatory patterns. The RFI consists of a modified digital fundus camera with a stroboscopic flash delivery system. Studies consist of high-speed sequences of 8 red-free fundus images captured within 125 ms. Sequences allow velocity and flow analysis of individual retinal vessels within each frame and can be reviewed as video loops which highlight flow directions and patterns.

**Results:** Twenty eight eyes of 21 patients were studied. (8 eyes of six normal subjects and 20 eyes of thirteen patients with known ocular diseases). Review of video RFI sequences identified four distinct dynamic flow patterns of retinal collateral circulation:

1. "Looped" arteriovenous anastomotic collateral vessels, which are characterized by a link joining the endings of the adjacent artery and vein and has an appearance of a loop.
2. "Vertical" arteriovenous anastomotic collateral vessels, which cross the horizontal raphe connecting the superior and inferior vascular arcades.
3. "H-shaped" horizontal arteriovenous anastomotic collateral vessels, which are characterized by connection between two adjacent vessels (artery and vein) in the middle of their extent instead of at the ends like the "looped" pattern.
4. "Retinal-Cilioretinal" anastomotic collateral vessels, which are characterized by the connection between a cilioretinal artery and retinal blood vessels.

**Conclusions:** This is the first report of occult collateral retinal vascular patterns imaged dynamically without contrast agents, using the RFI. The ability to non-invasively detect anomalous microvascular changes as described here may enhance our understanding.

## Photocoagulation In The Retinal Nerve Fiber Layer Thickness Measured By Scanning Laser Polarimetry"

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### ABSTRACT

**Background/Aims:** To determine whether diabetic retinopathy (DR) and panretinal photocoagulation (PRP) alter the retinal nerve fiber layer (RNFL) thickness. **Methods:** Patients with DR with and without PRP as well as non-diabetic control subjects were enrolled in this cross-sectional study. Patients with significant ocular disease other than diabetic retinopathy were excluded. Participants underwent a complete ophthalmic evaluation including grading of DR and scanning laser polarimetry with variable corneal compensation (GDx-VCC) to obtain RNFL thickness measurements. The mean of two optimal GDx image scans of each eye was used for statistical analysis. **Results:** A total of 16 healthy individuals (31 eyes) and 30 diabetic patients (50 eyes) underwent GDx examination. The mean (SD) overall (TSNIT) average thickness in healthy subjects was 57.4  $\mu\text{m}$  (6.5), in diabetic patients without PRP was 54.6  $\mu\text{m}$  (5.7), and in diabetic patients with PRP was 51.0  $\mu\text{m}$  (9.2) ( $P = 0.02$ ). **Conclusions:** RNFL is thinner in diabetic patients treated with PRP when compared to both patients with diabetic retinopathy without PRP and healthy subjects. This thinning of the RNFL may result from axonal degeneration caused by PRP as well as from progression of diabetic retinopathy and must be taken into account in the glaucoma screening and evaluation.

## The Course of Uveitis in Women during Different Reproductive Stages Life

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### ***Purpose:***

To assess the prevalence, the incidence and the course of acute anterior uveitis. This will include the severity, duration of each flare up and its response to different line of treatment. We divided our patient with the diagnosis of anterior uveitis into three main groups according to their reproductive stage of life, focusing on effect of the level of sex steroid hormones on the intraocular inflammation.

### ***Design:***

Retrospective comparative study

### ***Participants:***

1896 patient from the NYEE were reviewed in this study over the last six years after obtain the appropriate The IRB approval from the department and the research administration. We divide this pool of patient into three main categories according to their reproductive stage as the following 139, 743, 1041 on premenarche, active reproductive, postmenopausal respectively. Out of these 1896 patients, 598 patients were determined as new patients. These new patients were distributed as 42, 313 and 243 on premenarche, active reproductive, postmenopausal respectively.

Assessment the course of uveitis will be conducted in the most recent 90 patients visit our office at the NYEE with the diagnosis of anterior uveitis for one year from the date of the visit. These 90 patients is divided into three main subgroups according to the patient age and her reproductive stage of life: 30 patients in pre menarche, 30 patients in active reproductive period and 30 patients in postmenopausal.

***Methods:*** 1896 patient with diagnosis AU were reviewed in this study over the last six years in uveitis service, analysis of the number of visits was obtained using our NYEE –MD. Office soft wear. For the other 90 patients, thorough chart

review was obtained to the most recent 90 patients visit our office at the NYEE with the diagnosis of anterior uveitis for one year from the date of the visit.

### ***Main outcome Measures:***

The course of the study extended for one year retrograde from the date of the last visit. During this one year, we will review the patient chart focusing on the course of the disease including the number of relapse, the duration of each one, and the different line of treatment needed to control these inflammations.

### ***Results:***

Assessment of the total number of patients over the last six years, the total number of new patient with the diagnosis of anterior uveitis shows marked increases in prevalence of anterior uveitis in the postmenopausal and increased in the incidence of anterior uveitis during the active reproductive period.

Review of 90 patient chart to study the course of uveitis flare up shows that the incidence of uveitis flare up is much higher during reproductive age of life comparison to premenarche and postmenopausal. We found the number of flare up is 15 during the active reproductive period in comparison to 9 flare up during the premenarche and 4 flare up during postmenopausal.

The severity of flare up is much stronger during premenarch based on average cells density in the anterior chamber using the grading system (1+to 4+) which is 2.6 in comparison to reproductive and post menopausal which is 1.4 and 2.2 respectively. The average duration of each flare up is during premenarche around 40 days, which is longer in compare the active reproductive, and post menopausal which is 25 and 28 days respectively.

### ***Conclusion:***

The results show marked increase in the prevalence of anterior uveitis in postmenopausal but the incidence is more pronounced during the active reproductive period of life. The course of uveitis flare up is more intense during the premenarche in compare to the other two different stages of reproduction, i.e. active reproductive and postmenopausal stage of life.

## Disc hemorrhage characteristics in patients on anticoagulant or antihypertensive medications

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### Abstract

**Purpose.** Disc hemorrhages (DH) have been reported to occur more frequently in patients on anticoagulant medications. We sought to compare disc hemorrhage characteristics in patients on anticoagulant or antihypertensive medications to those not on these medications.

**Design.** Retrospective study.

**Methods.** All digital optic nerve stereophotographs obtained over a one year period were screened for the presence of DH. Only patients with disc hemorrhage were included. The location of the greatest beta zone parapapillary atrophy (PPA) width as defined by the radial distance between the scleral rim and the outer border of the beta zone was compared in each patient. The clock hour location of the DH and the greatest beta zone PPA width was determined. Baseline central corneal thickness, intraocular pressure, vertical cup-to-disc ratio and visual field indices were obtained. An examiner masked to the patient's medications then determined, for each DH, the size (large vs. small), the location (solely within the cup or in contact with the rim), the relationship to PPA (within area of PPA or not), the relationship to rim damage (within area of damage or not), the relationship to field damage (within a region of nerve corresponding to field damage or not).

**Results.** Photographs from 1559 glaucoma patients were evaluated and 46 eyes with unilateral DH were identified. We found that disc hemorrhages did not differ with respect to size, location within the cup, or location with respect to PPA, rim damage, or field damage between patients on anticoagulant or antihypertensive medications.

**Conclusions.** Patients taking anticoagulant or antihypertensive medications have similar DH characteristics to those not on these medications.