Interactive Grand Rounds

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Disclosures:

- Sun Pharmaceuticals: speakers bureau,
- Dompe: advisory board,
- RVL Pharmaceuticals: advisory board

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Case

- 50 YR WM
- POHx: had cataract surgery in his left eye at age 25 secondary to trauma to the eye,
  - Has a mid-dilated pupil post trauma
- PMHx: no known health problems and no medications
- VA: 6/6 (20/20) OD, OS

Health Assessment

- SLE:
  - OD unremarkable
  - OS: mid-dilated pupil with sluggish response to light
    - PCIOL well centered and no haze
- IOP: OD 12 and OS 26 mm Hg (TAG)
  - NCT OS (31 and 23)
  - Second visit: OD: 13 and OS: 27

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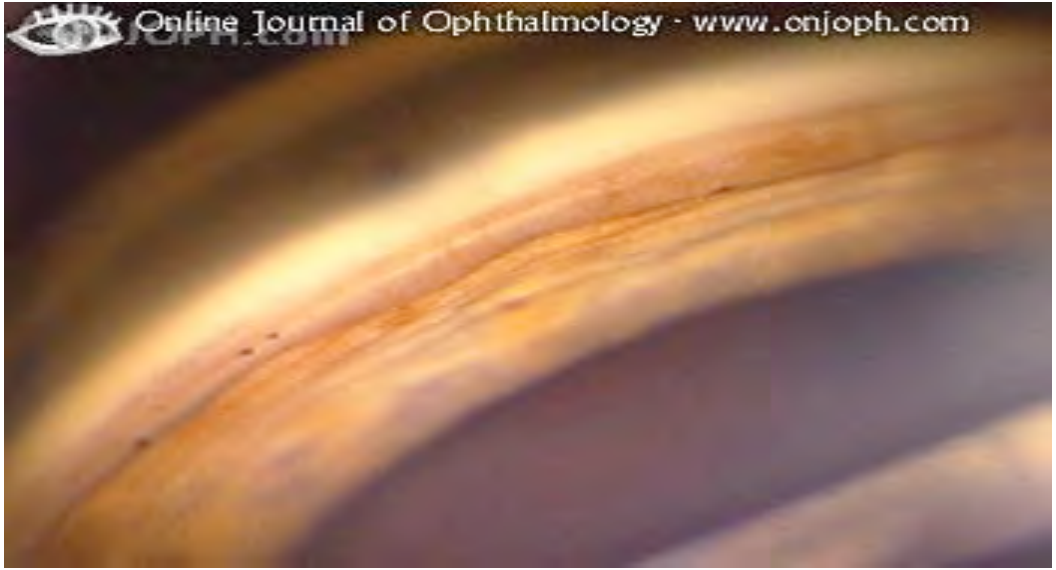
Health Assessment

- Gonioscopy:
  - OD: unremarkable
  - OS: see photo



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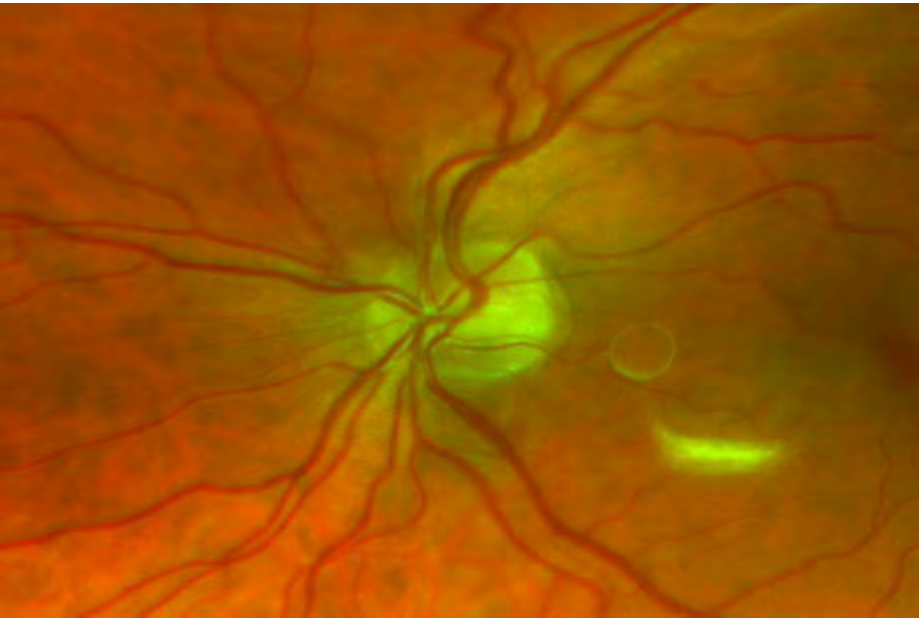
Optic Nerves



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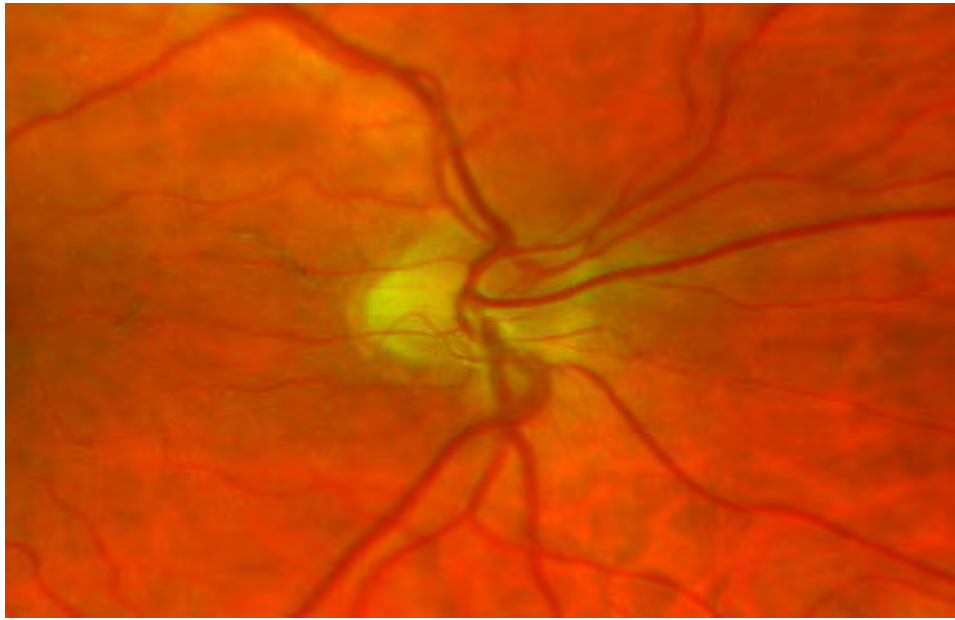

OD

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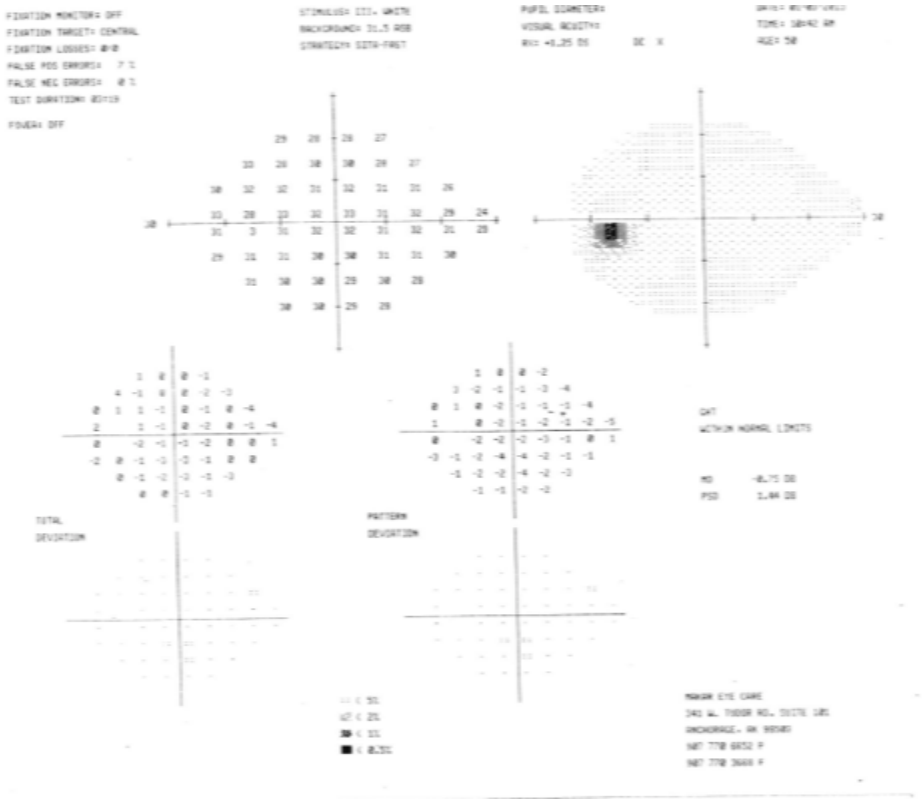
Visual Fields



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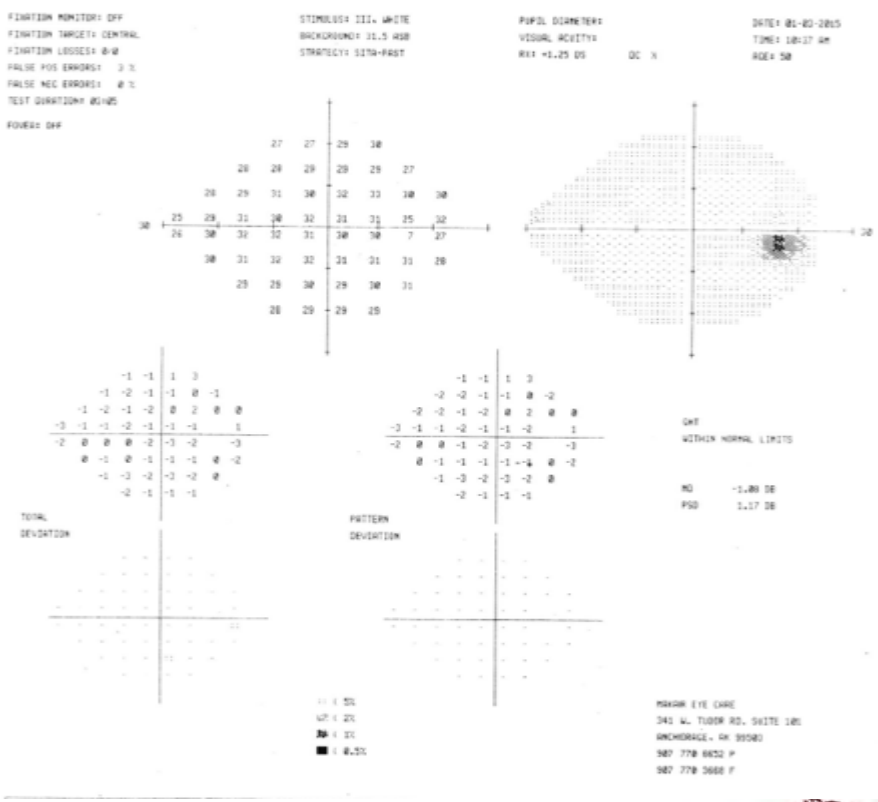

OD

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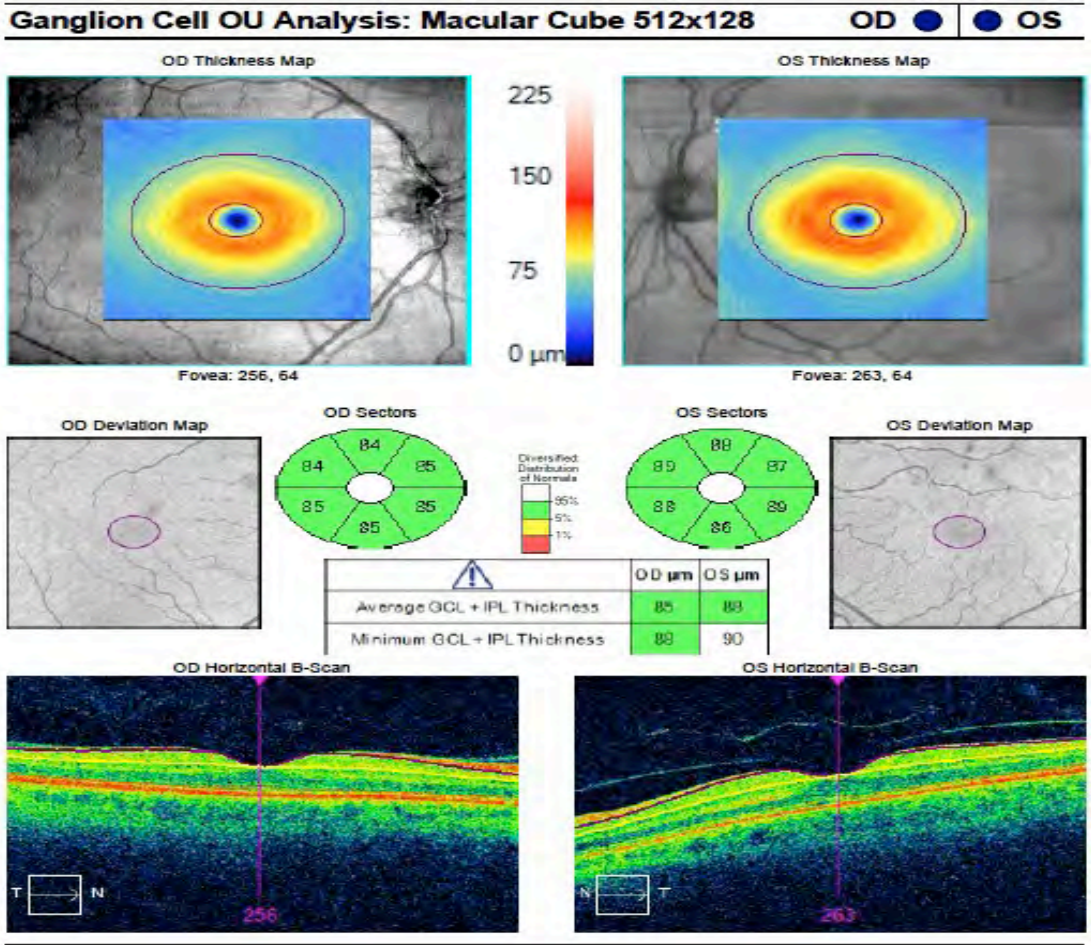
Ganglion Cell Analysis



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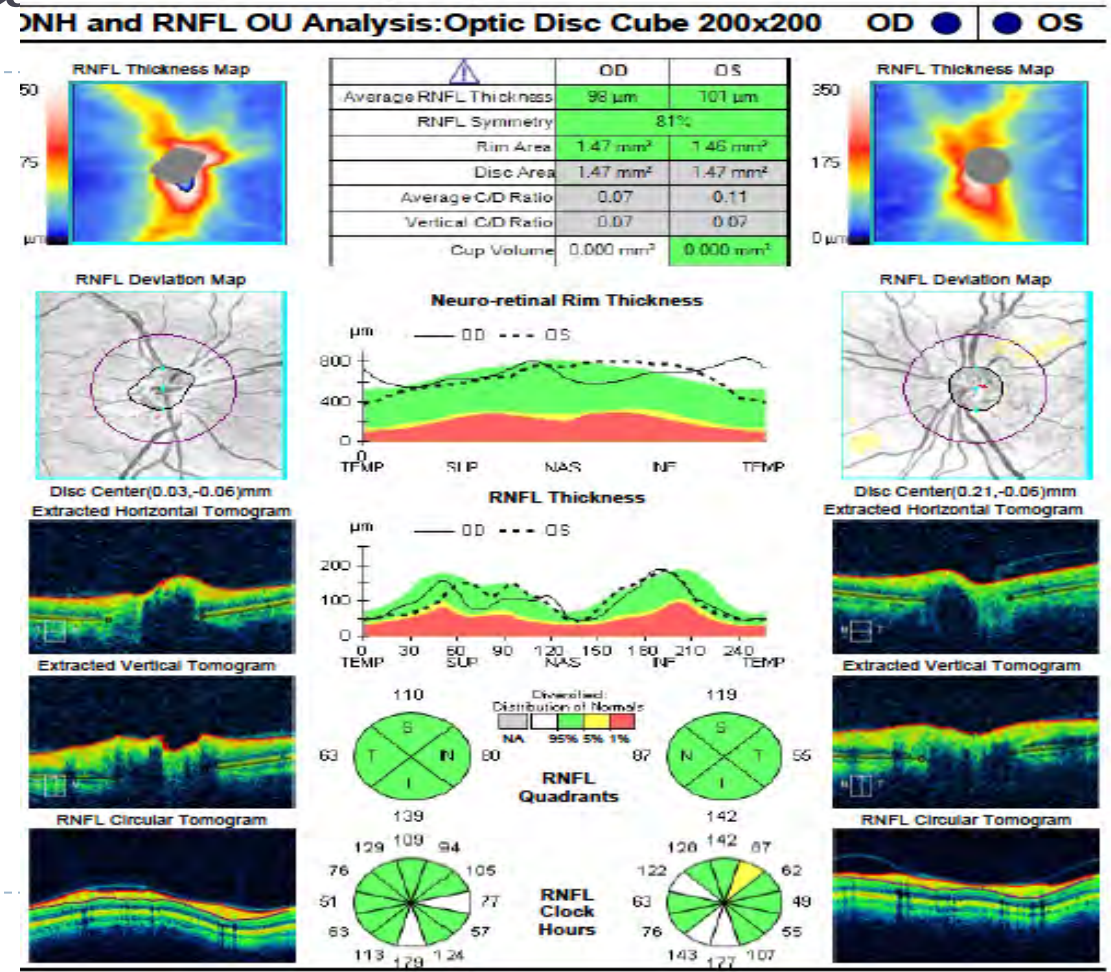
RNFL and ONH Analysis



Patient Update

- Patient was seen a year later
- Latanoprost qhs (remembers 5 days out of week)
- IOP's: OD: 14 and OS: 13 mm Hg
- No change in OCT

Angle Recession

- investigators have reported that more than 60% of eyes with non-penetrating traumatic injuries will have some degree of angle recession.
- although traumatic angle recessions may occur without anterior chamber hemorrhage,
  - a strong correlation between hyphema and angle recession has been established.
- Careful gonioscopy has revealed that between 56% and 100% of patients with traumatic hyphema have some degree of angle recession

Angle Recession: Causes

- The most frequent cause of injury-inducing angle recession occurred as a result of:
  - sports or other recreational accidents
  - assault
    - Less common causes are:
      - automobile or industrial accidents,
      - projectiles from toy guns or slingshots, and
      - other leisure activities
  - A small percentage of people will deny any previous episode of ocular trauma despite the presence of obvious eyelid scars and pupillary sphincter tears.

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Angle Recession Glaucoma

- Although recession of the iridocorneal angle is common after blunt trauma,
  - only 6% to 7% of these eyes will eventually develop glaucoma
- There appear to be two peak incidences of glaucoma after angle recession.
  - the first peak occurs within the first few weeks to years after the trauma, and
  - the second peak occurs 10 or more years after the injury

Angle Recession Glaucoma

- There is an association between the extent of angle recession and the development of glaucoma
- It appears that those eyes with less than 180 degrees of recession are unlikely to develop glaucoma
- whereas most investigators agree that patients with 180 to 360 degrees of angle recession will have a greater risk of developing late-occurring glaucoma

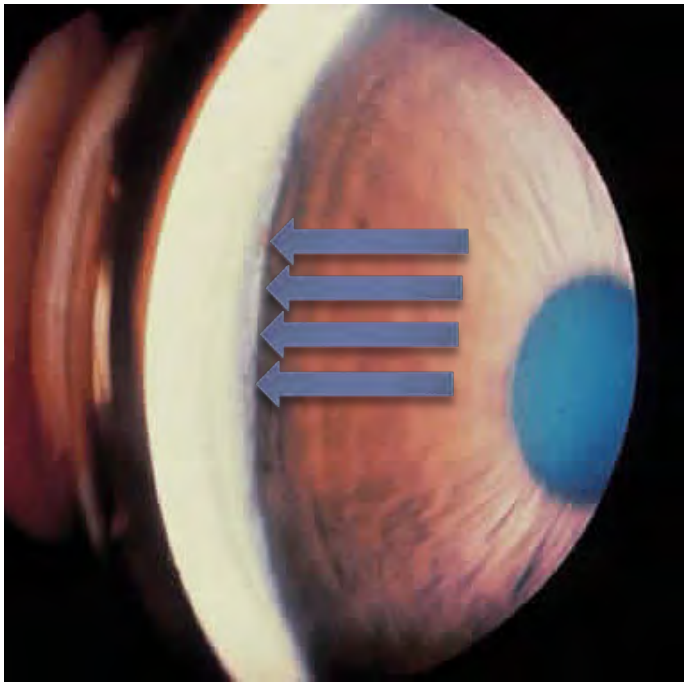
Angle Recession Glaucoma

- In eyes that do develop angle recession glaucoma:
  - the contralateral nontraumatized eye has been reported to have a 50% chance of developing open-angle glaucoma, sometimes years after the pressure rise was noted in the traumatized eye.

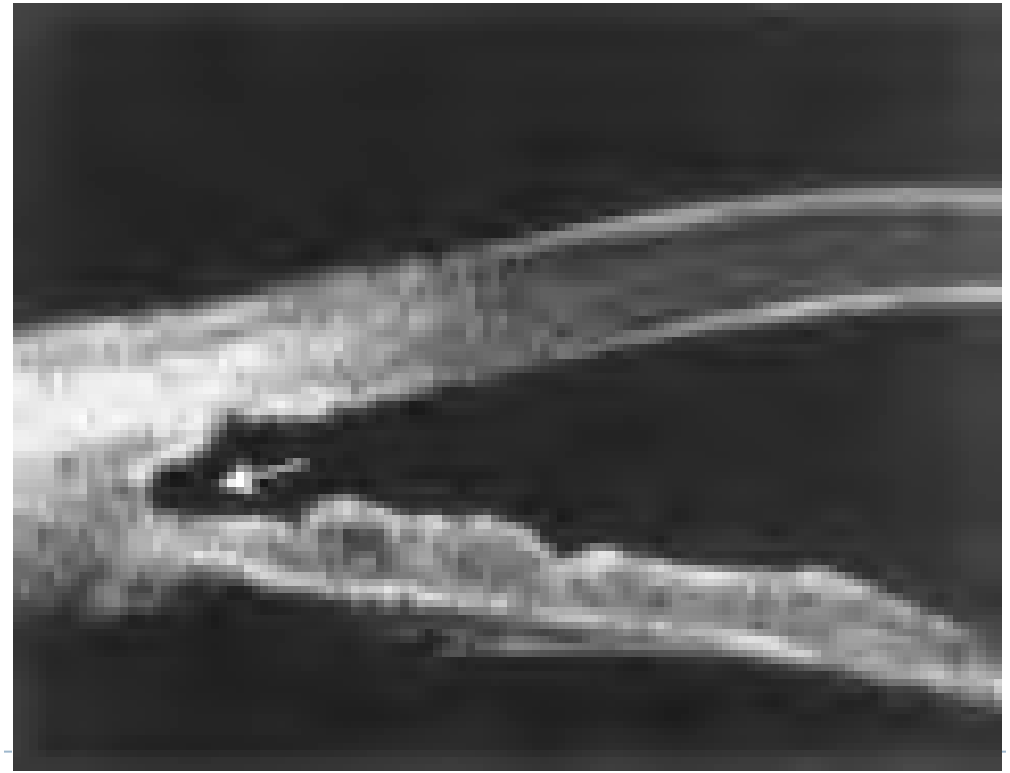
Angle Recession Diagnosis

- The diagnosis of angle recession is made by patient history and clinical examination.
  - In cases of unilateral glaucoma or traumatic hyphema or after blunt trauma, angle recession should always be considered
- With milder injuries
  - the examiner may have to compare the gonioscopic appearance of two parts of the angle of 1 eye to identify subtle changes in the injured angle.

Angle Recession



Ultrasound Angle Recession



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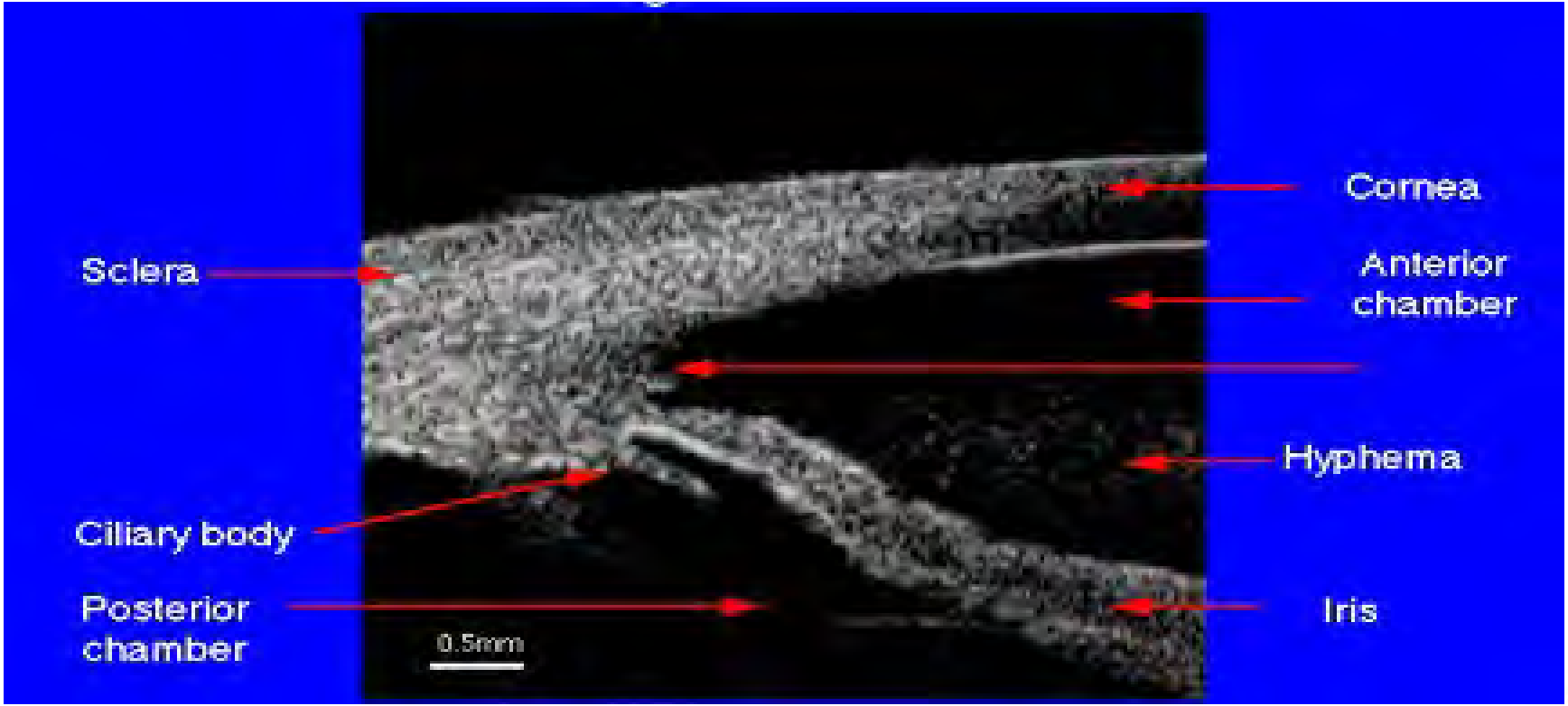
Anterior Segment OCT: Angle Recession



Treatment

- The IOP rise that occurs immediately after blunt trauma to the eye is usually self-limited and, in the majority of cases, can be controlled with medication alone.
- The late IOP rise that occurs years after the injury is more difficult to treat medically and may require surgical intervention.

Treatment

- Angle recession glaucoma is initially treated medically with the realization that miotics may be ineffective because of the disruption of the normal ciliary muscle–scleral spur relationship.
- There have been reports that miotics may cause a paradoxical increase in intraocular pressure in patients with angle recession, possibly by decreasing the uveoscleral outflow.

Treatment

- Glaucoma medications that decrease aqueous formation, such as beta blockers, carbonic anhydrase inhibitors, or alpha2-agonists, may be useful.
- Prostaglandin analogs, which are claimed to increase uveoscleral outflow, may also be of benefit

Case History

- 38 black male, complaining that the vision in his right eye is blurry.
  - Got the current Rx 3 weeks previously, and started out good but in last couple of days OD vision has become blurry
- Medical Hx: no current health concerns and no medications

Entrance Skills

- Va's: OD: 20/25, OS: 20/20
- Pupils: PERRL
- CVF: full to finger count
- EOM's: FROM
- Amsler: central metamorphopsia OD
- HVF: 10-2 (see VF)

SINGLE FIELD ANALYSIS

EYE: RIGHT

NAME: [redacted]

ID: 110724

DOB: 03-08-1969

CENTRAL 10-2 THRESHOLD TEST

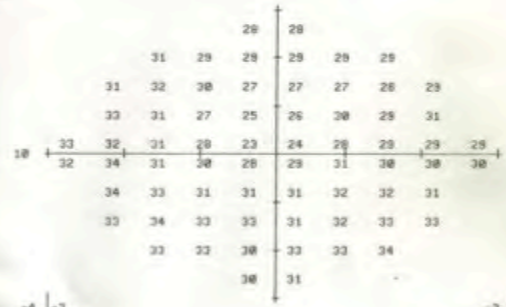
FIXATION MONITOR: GAZE/BLINDSPOT
FIXATION TARGET: CENTRAL
FIXATION LOSSES: 2/15
FALSE POS ERRORS: 0 %
FALSE NEG ERRORS: 0 %
TEST DURATION: 06:32

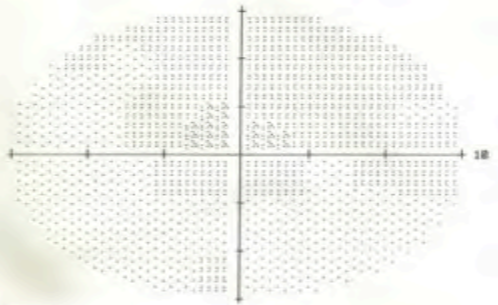
FOVEA: OFF

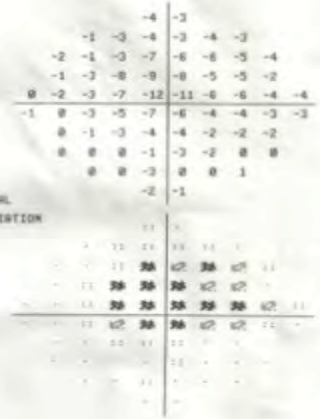
STIMULUS: III, WHITE
BACKGROUND: 31.5 ASB
STRATEGY: SITA-STANDARD

PUPIL DIAMETER: 5.5 MM
VISUAL ACUITY:
RX: +4.00 DS -2.00 DC X 115

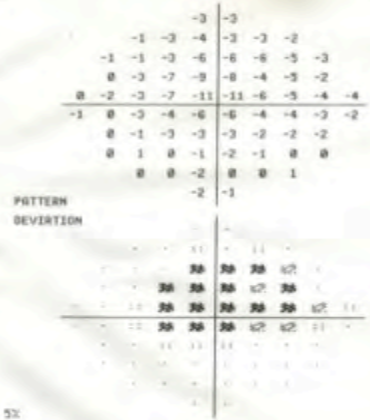
DATE: 09-19-2007
TIME: 10:07 AM
AGE: 38







TOTAL DEVIATION



PATTERN DEVIATION

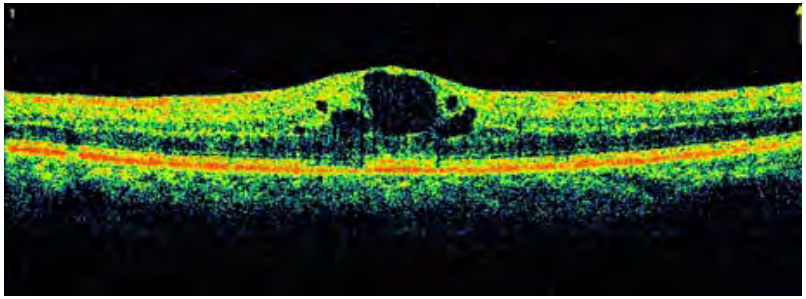
MD -3.12 DB P < 2%
PSD 2.60 DB P < 1%

:: < 5%
:: < 2%
:: < 1%

PACIFIC UNIVERSITY FAMILY EYE CENTER
511 SW 10TH AVE
PORTLAND, OR

Which of the following OCT's goes with this patient?

1



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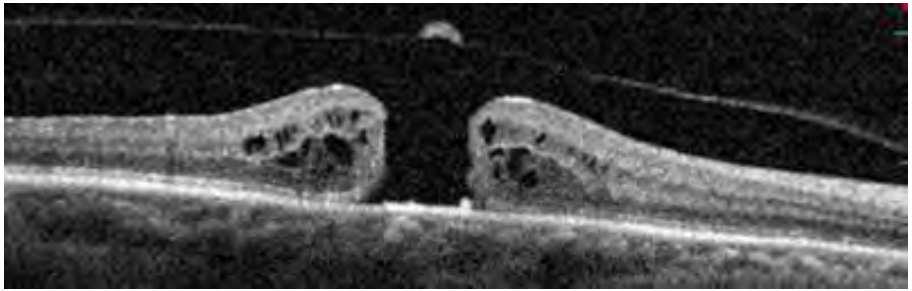
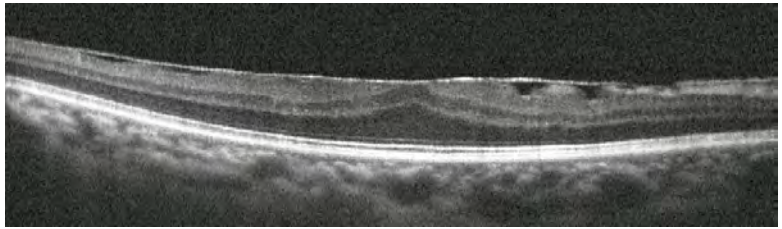


3



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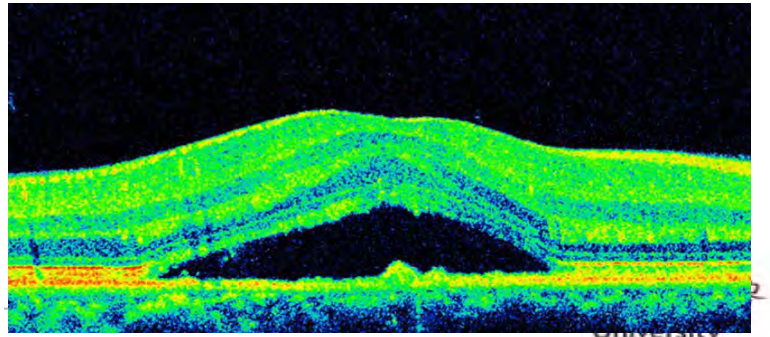
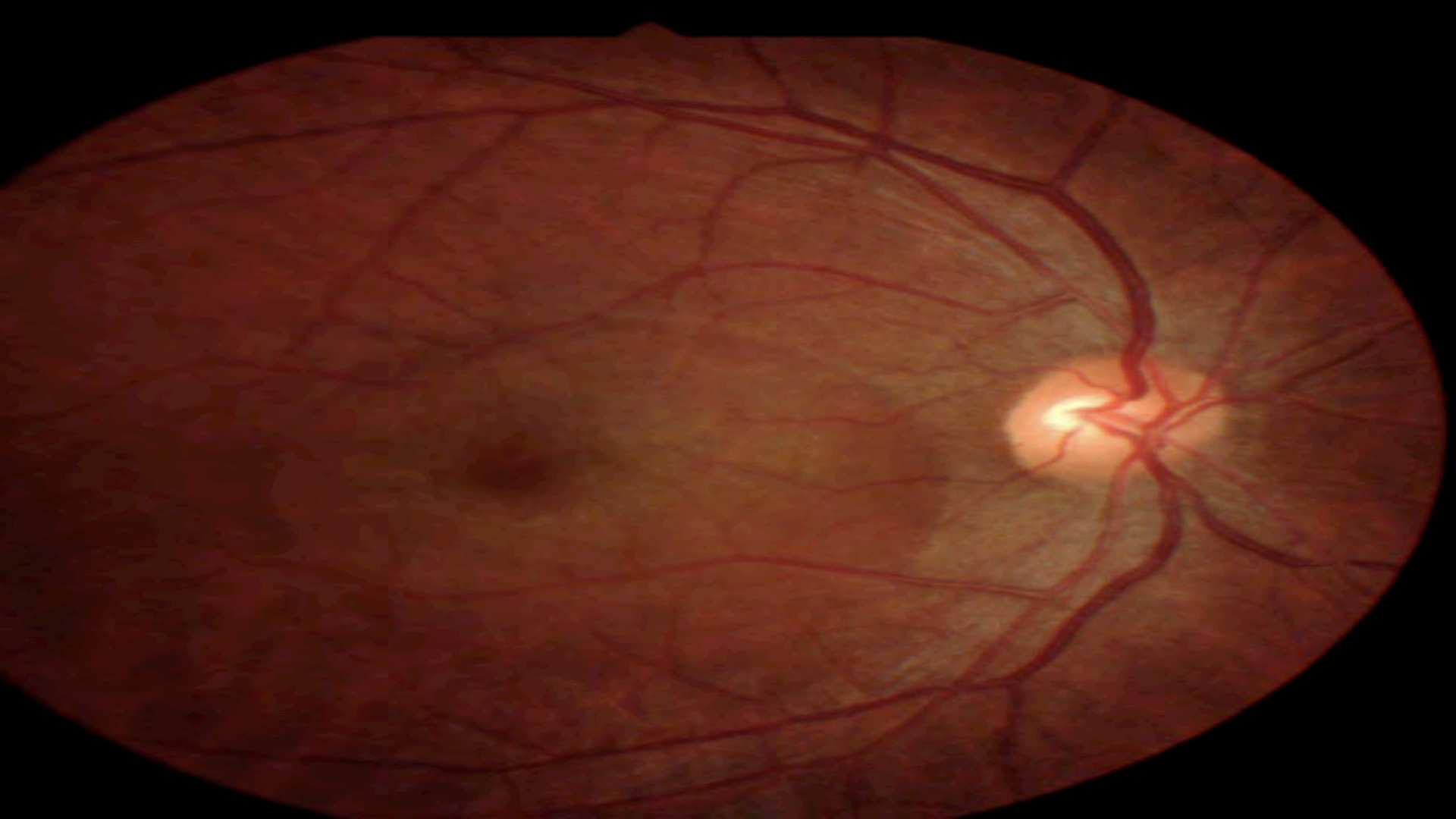




Central Serous Retinopathy

- an exudative chorioretinopathy characterized by an exudative neurosensory retinal detachment with or without an associated detachment of the retinal pigment epithelium (RPE)
- Patients experience blurry vision, metamorphopsia and micropsia
- individuals between 20 and 50 years of age

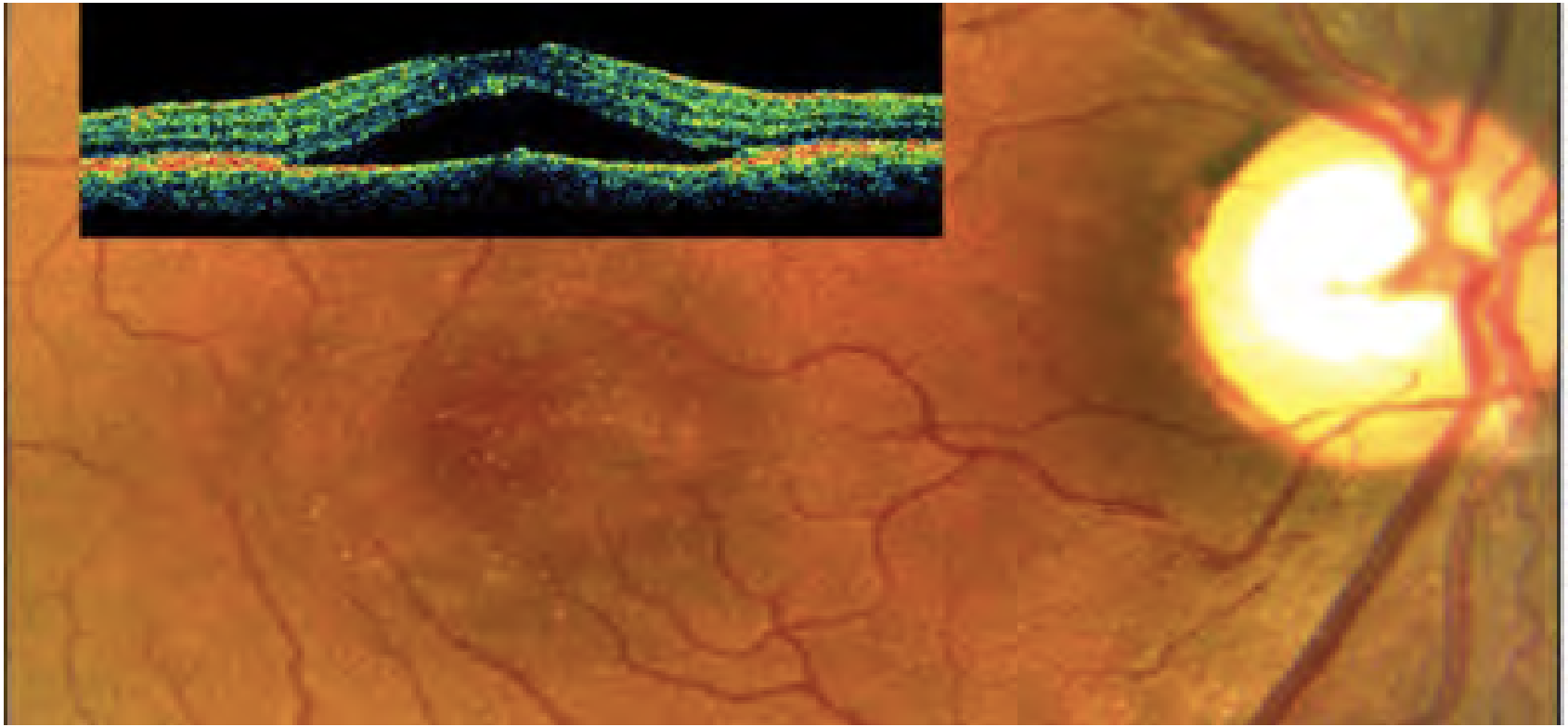
Central Serous Retinopathy

- incidence in men vs women is approximately 6:1
- associated with stress and stress hormones (ie, corticosteroids and epinephrine);
- individuals with a "type A personality" who are under stress
- recurrence in the ipsilateral eye is approximately 30% and CSR in the fellow eye was 32%

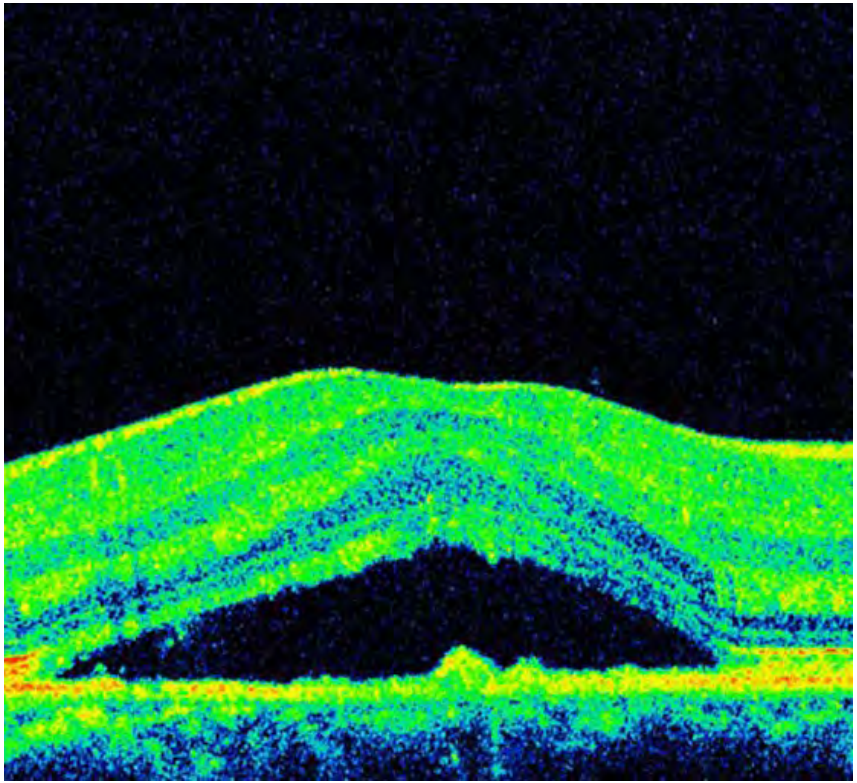
Central Serous Retinopathy

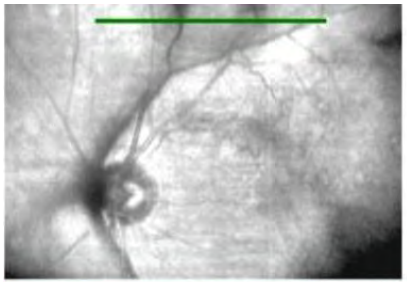
- systemic associations of CSCR include:
  - Sleep apnea syndrome
  - Systemic hypertension
  - Psychopharmacologic medications
  - Systemic lupus erythematosus
  - Gastroesophageal reflux disease
- Association between *H. pylori* infection, peptic ulcer disease and CSCR has been reported in some studies

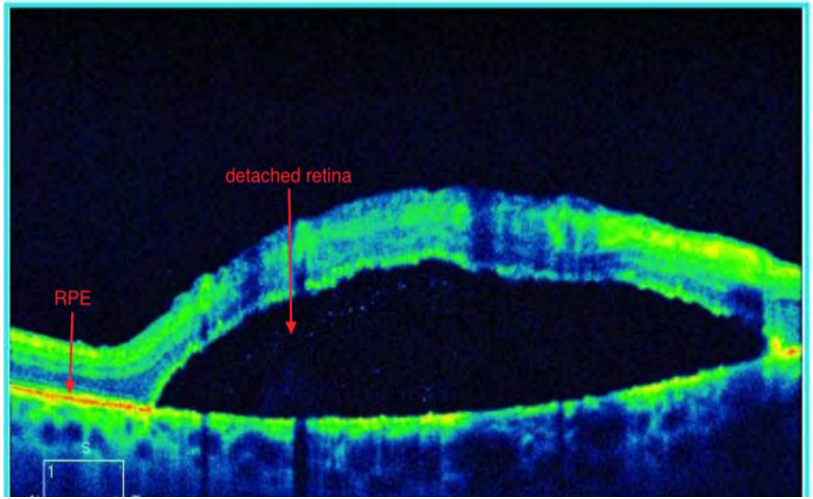
Central Serous Retinopathy



CSR versus RD







Central Serous Retinopathy

- 80% to 90% of cases resolve spontaneously within 3 months
- Treatment options:
  - include laser photocoagulation,
  - Anti-VEGF
    - Results remain inconclusive, and long term benefits warrant more studies.
  - "safety-enhanced" PDT (current "preferred" treatment option)
    - PDT causes vascular remodeling of the choroid and choroidal hypoperfusion.,
  - Acetazolamide reduced the time for subjective and objective CSR resolution, but it had no effect on final VA or recurrence rate. Most patients in the experimental group in that study had side effects from the acetazolamide, including paresthesias, nervousness, and gastric upset

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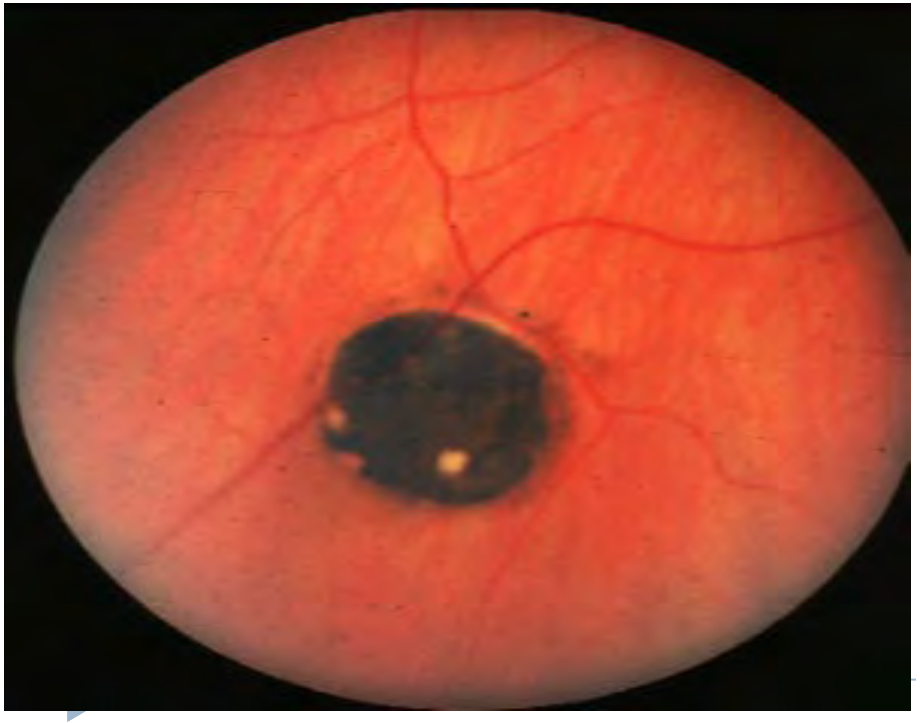
Central Serous Retinopathy

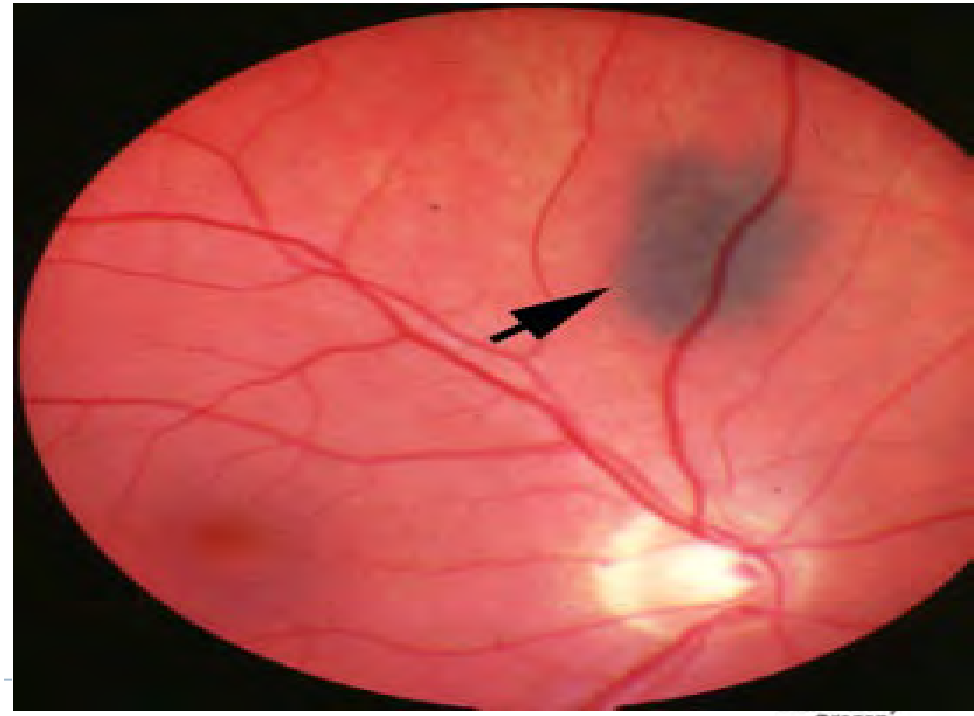
- Treatment options:
  - Topical NSAIDs:
    - Conflicting reports
    - Michael Singer, MD, from Medical Center Ophthalmology in San Antonio reported an increase in resolution time by 50%
    - PRADEEP VENKATESH, MD reports that NSAIDS treatment could possibly slow down or cause a rebound CSR

Latest Treatment Under Investigation

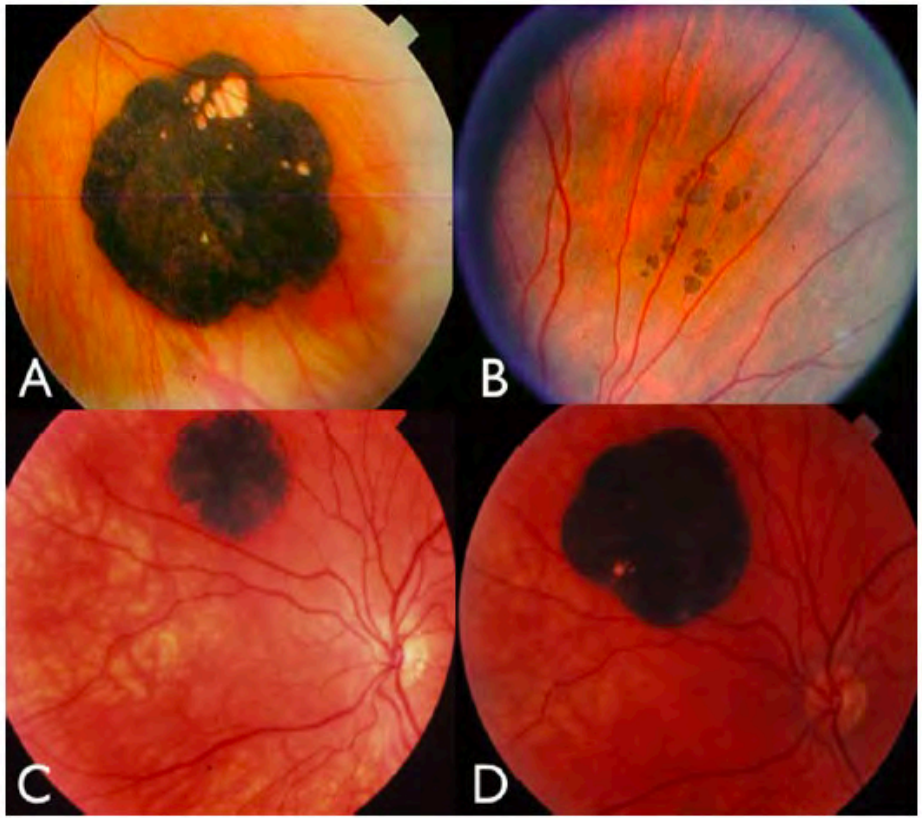
- Eplerenone is a mineralocorticoid antagonist receptor currently used in the treatment of hypertension and congestive heart failure.
- Literature has demonstrated improved resolution of CSR with no serious adverse effects.
- Several randomized clinical trials are currently underway.
  - Currently, its use in CSCR remains investigational and is not considered standard of care

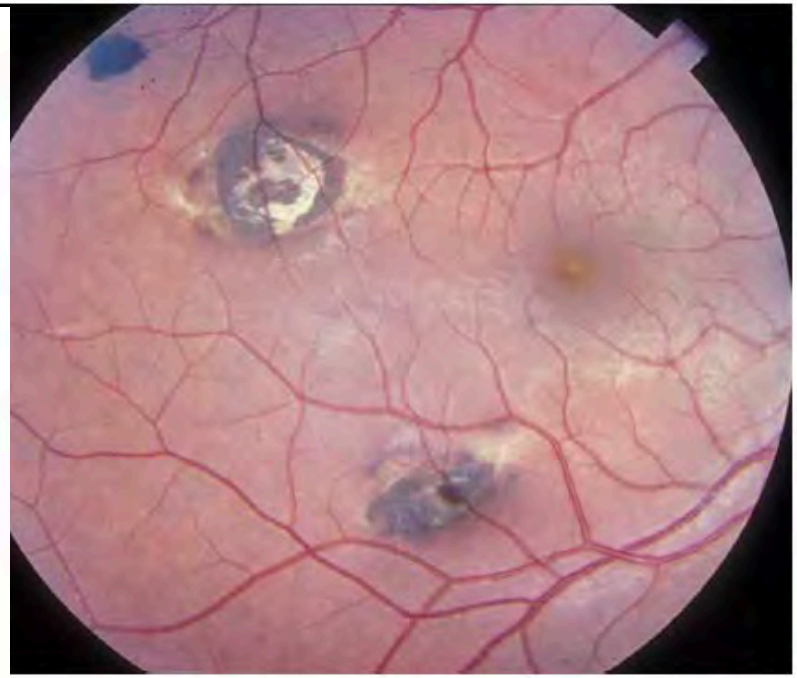
CHRPE vs Nevus





CHRPE vs Hamartomas





JRE 4. Retinal pigment epithelial hamartomas (pigmented ocular
lus lesions) associated with familial adenomatous polyposis
dner syndrome).

Nevi Trivia

- 31% of choroidal nevi show slight enlargement over time without the transformation to a melanoma (Ophthalmology 2011)
- The prevalence of choroidal nevi in the white U.S. population ranges from 4.6% to 7.9%
  - If it is assumed that all choroidal melanomas arise from preexisting nevi, then the published data suggest a low rate (1/8845) of malignant transformation of a choroidal nevus in the U.S. white population. (Ophthalmology 2005)
- Choroidal melanoma risk for metastasis, ranging from 16% to 53% (at 5 years of follow-up) depending on the size of the tumor at the time of diagnosis. (Arch Ophthalmol 1992)

TFSOM-UHHD:

"To Find Small Ocular Melanoma Using Helpful Hints Daily"

Thickness: lesions >2mm
Fluid: subretinal fluid
Symptoms: photopsia, vision loss
Orange pigment overlying the lesion
Margin touching optic nerve head (<3mm)
Ultrasound **H**ollowness
Halo absence
Drusen absence

- Choroidal nevi showing no features should be initially monitored twice yearly and followed up annually
- 1 or 2 features should be monitored every 4 to 6 months.
- Nevi with 3 or more features should be evaluated at an experienced center for management alternatives and possible treatment owing to the high risk of ultimate growth

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Updated Mnemonic

Use of multimodal imaging:

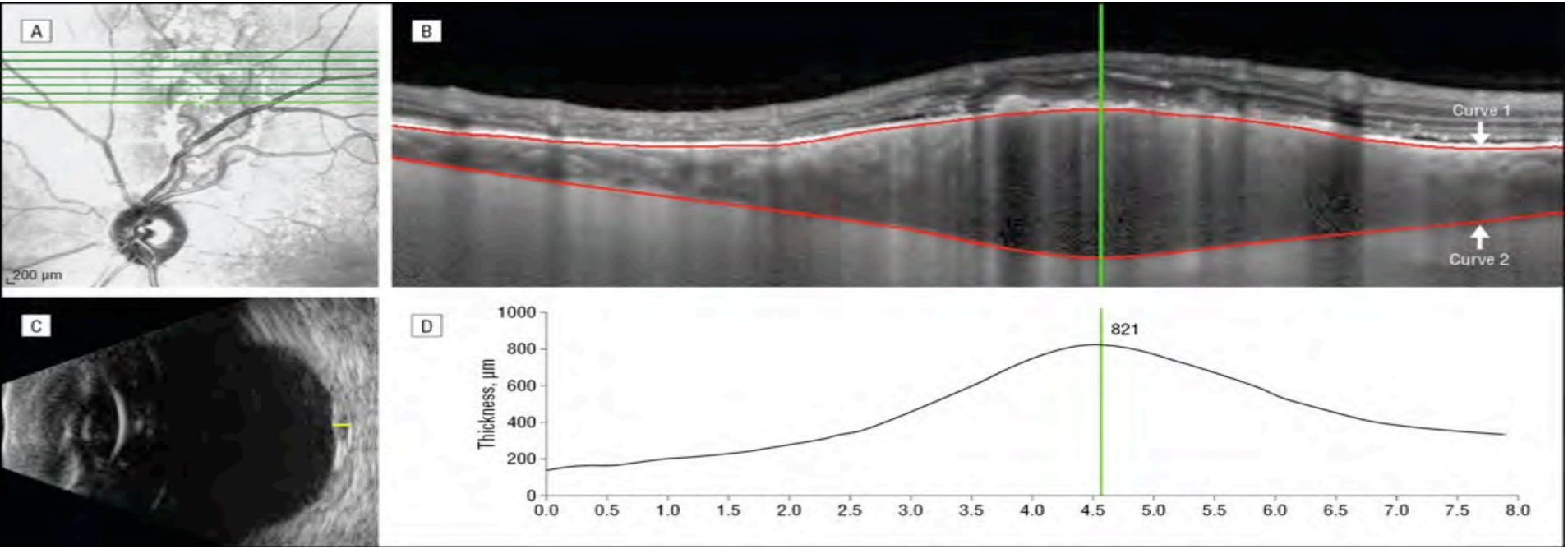
- T – thickness < 2mm by B-scan ultrasonography
- F – no SRF on OCT
- S – no symptoms, visual acuity > 20/50
- O – no fundus autofluorescence
- M – no ultrasonographic hollowness on B-scan
- DIM – diameter > 5 mm

- 5-year estimated tumour growth was found :
  - 1% of nevi with no risk factors,
  - 11% (range 9%–37%) with one factor,
  - 22% (12%–68%) with two factors,
  - 34% (21%–100%) with three factors,
  - 51% (0%–100%) with four factors and
  - 55% (0%–100%) with five factors.

Dalvin LA, Shields CL, Ancona-Lezama DA, et al Combination of multimodal imaging features predictive of choroidal nevus transformation into melanoma British Journal of Ophthalmology 2019;103:1441-1447.

From: **Enhanced Depth Imaging Optical Coherence Tomography of Small Choroidal Melanoma: Comparison With Choroidal Nevus**

Arch Ophthalmol. 2012;130(7):850-856. doi:10.1001/archophthalmol.2012.1135



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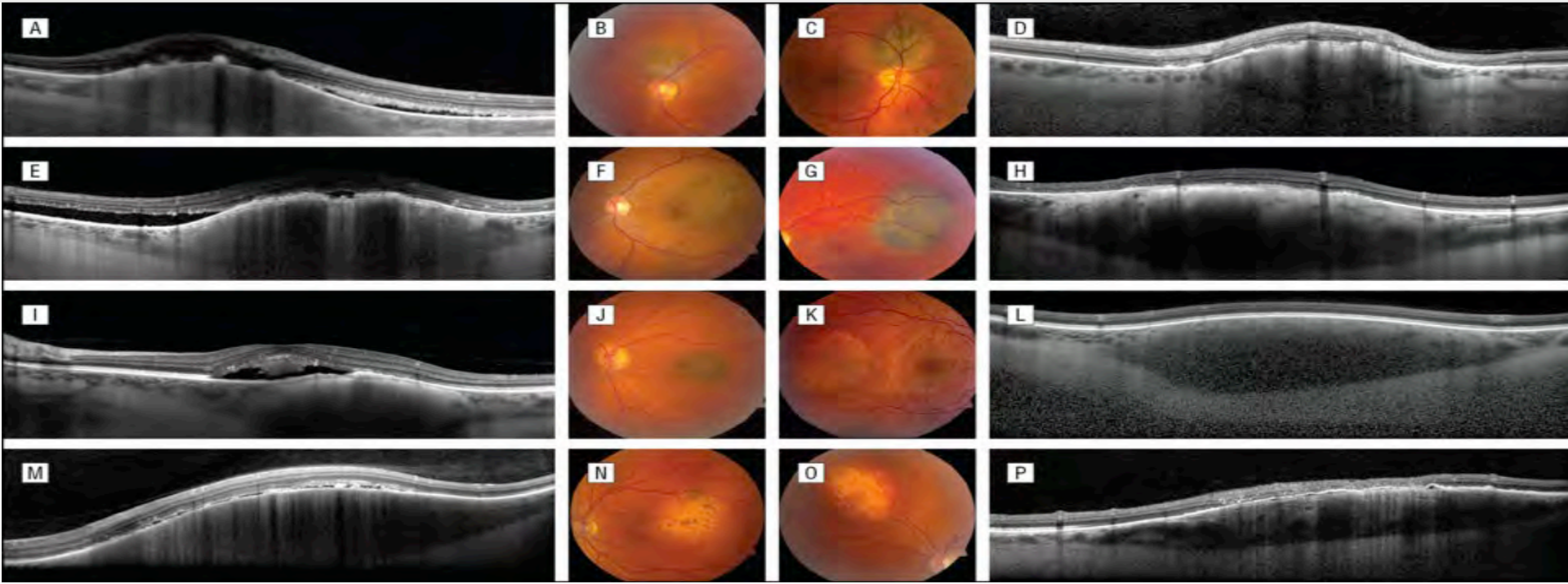
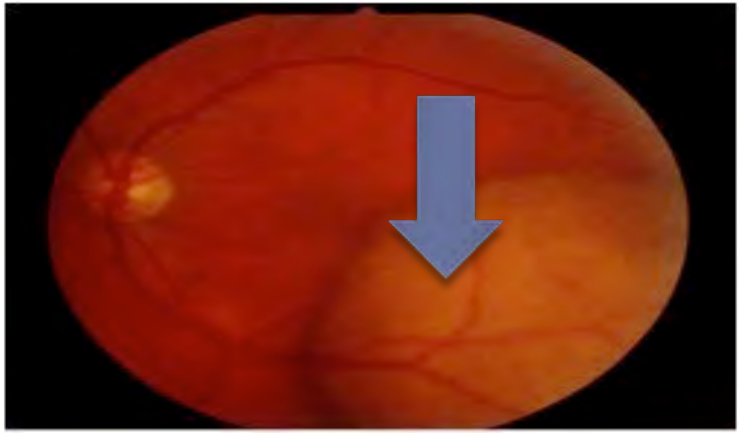
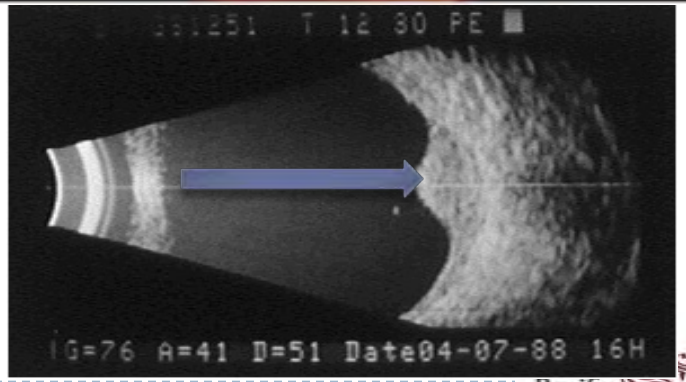


Case

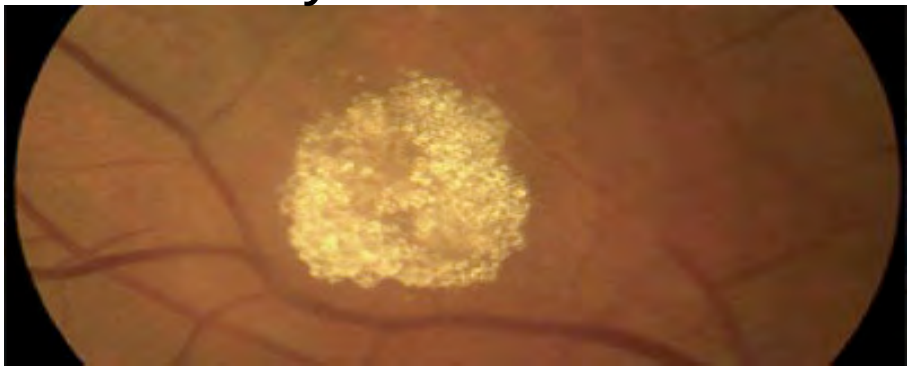
- 65 yr old white male
  - Notices spot in vision in his left eye
  - Diabetes for 15 years
- Vision:20/20 (6/6) and 20/40 (6/12)
- Dilated exam:
  - Large lesion noted in left eye (not noted in exam 6 months previously
  - See photo and B-scan



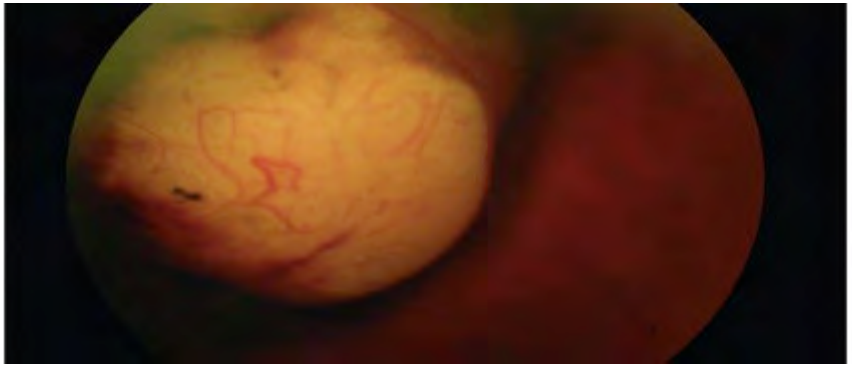


Ocular Tumors

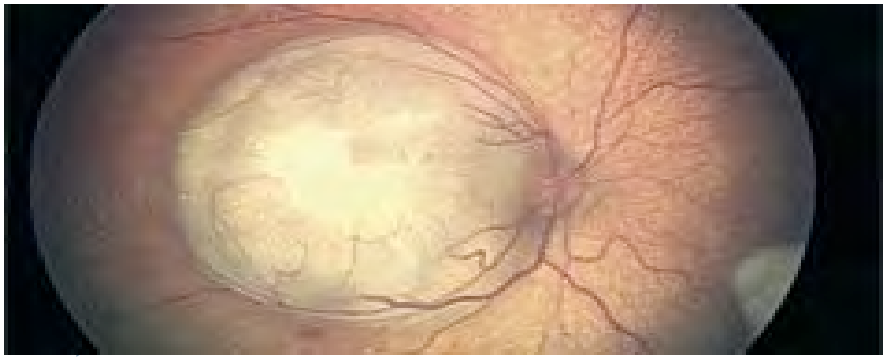
Astrocytic Hamartoma



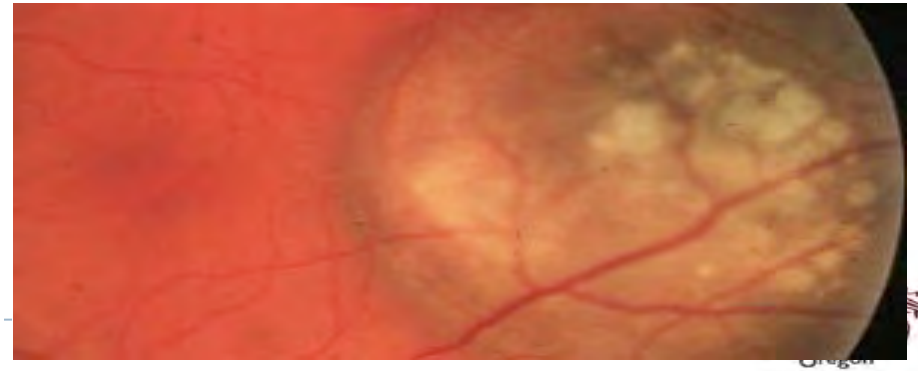
Amelanotic Melanoma



Retinoblastoma



Metastatic Choroidal Tumor



Choroidal Melanoma Metastases

- 80 to 90% of metastases from uveal melanoma occurred in the liver, less common sites being the skin and lung.
  - Gragoudas ES, Seddon JM, Egan KM, et al. Long-term results of proton beam irradiated uveal melanomas. Ophthalmology. 1987;94:349–53.

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Melanoma and Mortality

- Tumor Size:
  - 5-year mortality after enucleation:
    - 16% for small melanoma,
    - 32% for medium melanoma, and
    - 53% for large melanoma.
  - the prognostic importance of tumor size:
    - each 1-mm increase in melanoma thickness adds approximately 5% increased risk for metastatic disease at 10 years
- Tumor genetics:
  - Chromosome monosomy 3 (apprx 50% of patients)
    - 50% of them develop metastasis within 5 years of diagnosis
    - 70% mortality within 4 years of ocular treatment
    - one of the most important independent risk factors of poor survival

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New Treatment for Choroidal Melanoma

- light-activated AU-011 agent represents the first potential new therapy for choroidal melanoma
- AU-011 is a viral nanoparticle conjugate delivered by intravitreal injection, which targets tumor cells in the choroid and then is activated by ophthalmic laser to disrupt the tumor cell membrane, leading to necrosis.
- Two year prospective study complete

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New Treatment for Choroidal Melanoma

- **Total cohort of 36**
  - **12 patients in the single-dose cohort demonstrated a modest tumor control rate of 67% with a follow-up period of 9 to 24 months, and**
  - **22 patients in the multiple-dose cohort (2 patients lost to follow-up) demonstrated a modest tumor control rate of 77% with a follow-up period of 0.5 to 18 months.**
  - **Subjects treated with the maximum safe and tolerated dose (80 µg with 2 lasers) with 0.5 months to 6 months follow-up have a tumor control rate of 92% (13 of 14 subjects).**
  - **Vision was preserved in all patients at 3 months or longer up to 24 months.**

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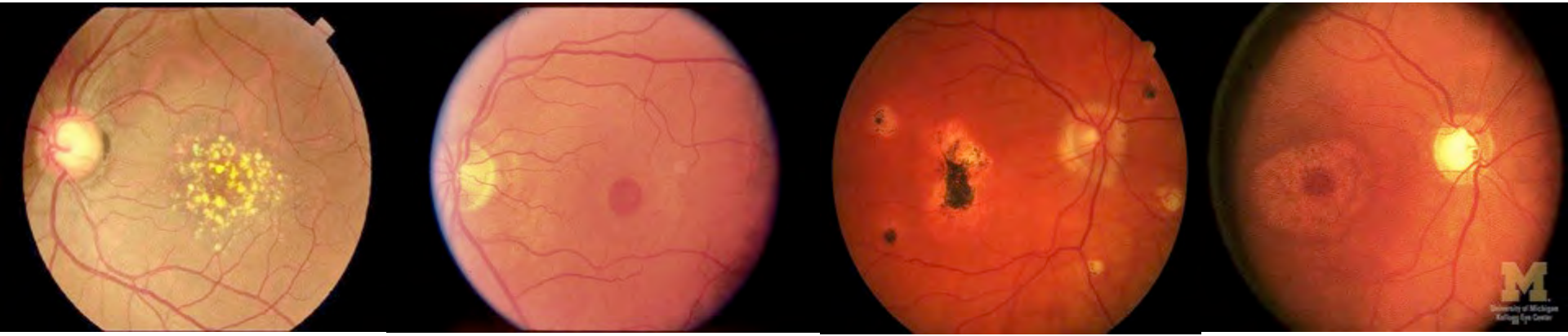
Question

Which of the following depicts a retina undergoing hydroxychloroquine toxicity?



ARMD

Macular Hole

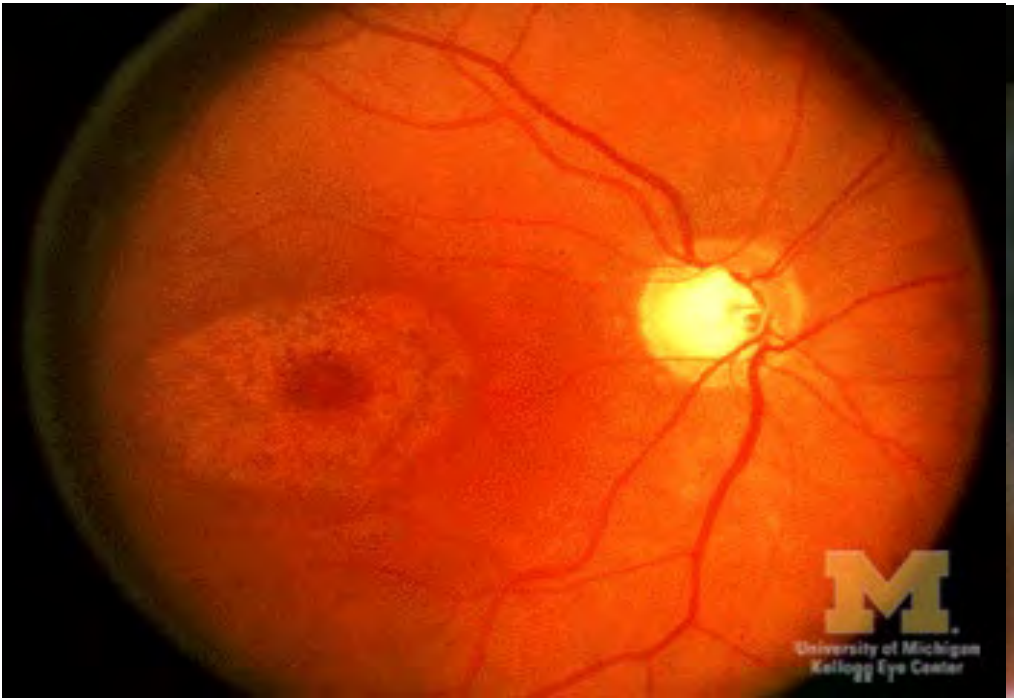
OHS

Bull's Eye Maculopathy

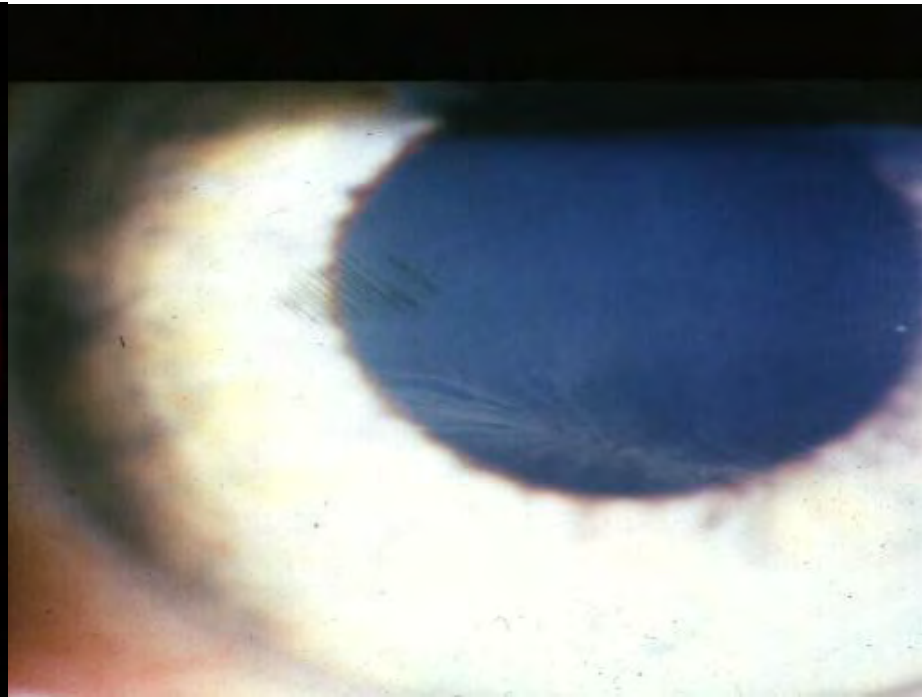
Treatment and Management: Antimalarial Ocular Complications

- Toxicity can lead to whorl keratopathy, "bulls eye" maculopathy, retinal vessel attenuation, and optic disc pallor.
- Early stages of maculopathy are seen as mild stippling or mottling and reversible loss of foveal light reflex
- "Classic" maculopathy is in form of a "bulls eye" and is seen in later stages of toxicity
  - this is an irreversible damage to the retina despite discontinuation of medication
- Whorl keratopathy possible with chloroquine. Most commonly amiodarone.
  - If whorl keratopathy is present in a patient not taking any medications consider Fabry's disease

Treatment and Management: Antimalarials



Bulls Eye Maculopathy



Whorl Keratopathy

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Revised Recommendations on Screening for Retinopathy

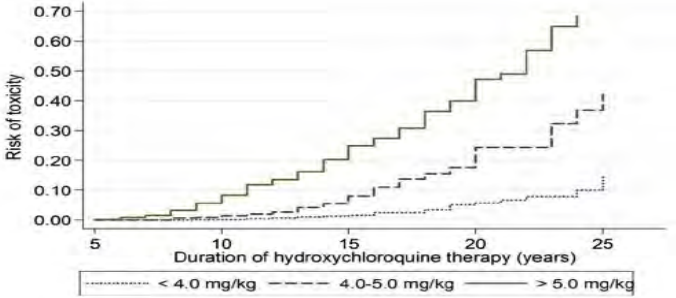
- 2002 recommendations for screening were published by Ophthalmology
- Revised recommendations on screening published in Ophthalmology 2011;118:415-42
  - Significant changes in light of new data on the prevalence of retinal toxicity and sensitivity of new diagnostic techniques
  - Risk of toxicity after years of use is higher than previously believed
    - Risk of toxicity approaches 1% for patients who exceed 5 years of exposure

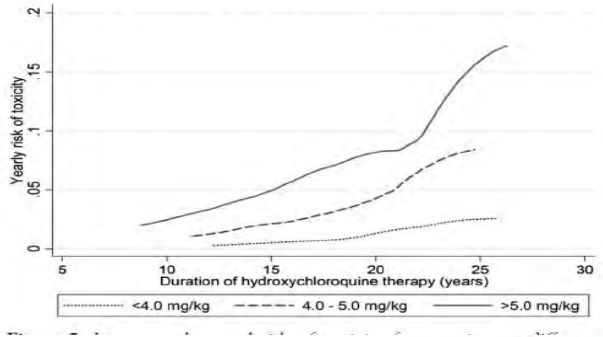
“New” New Recommendations

- **Recommendations on Screening for Chloroquine and Hydroxychloroquine Retinopathy** – Ophthalmology 2016; 123:1386-1394
  - Released March 2016 from American Academy of Ophthalmology
  - revised in light of new information about the prevalence of toxicity, risk factors, fundus distribution, and effectiveness of screening tools.

2016 Recommendations

- maximum daily HCQ use of 5.0 mg/kg real weight, which correlates better with risk than ideal weight.
- risk of toxicity is dependent on daily dose and duration of use.
  - at recommended doses:
    - risk of toxicity up to 5 years is under 1%
    - up to 10 years is under 2%
    - rises to almost 20% after 20 years. However, even after 20 years, a patient without toxicity has only a 4% risk of converting in the subsequent year.





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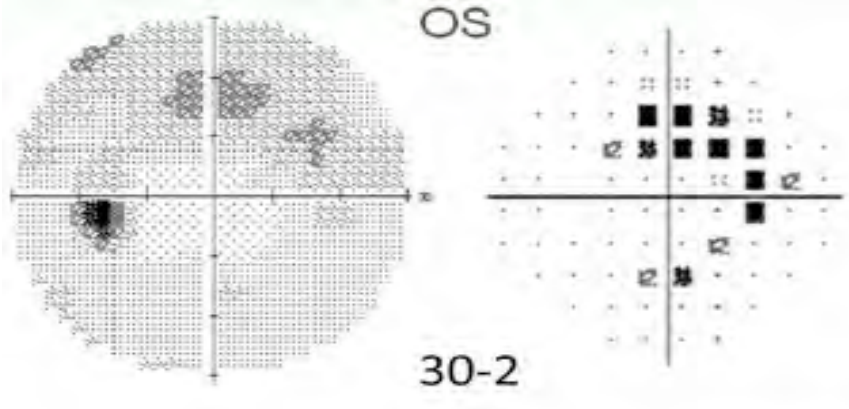
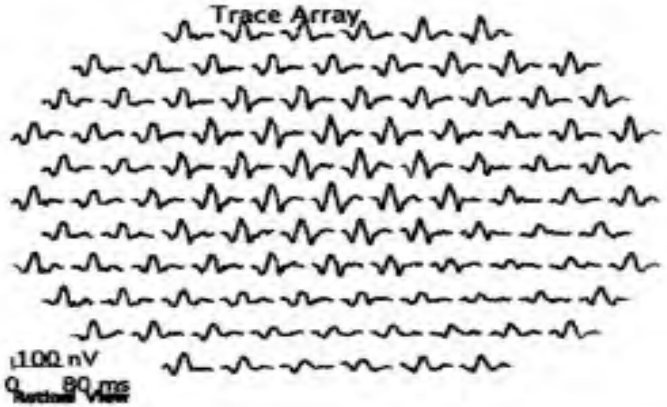
2016 Recommendations

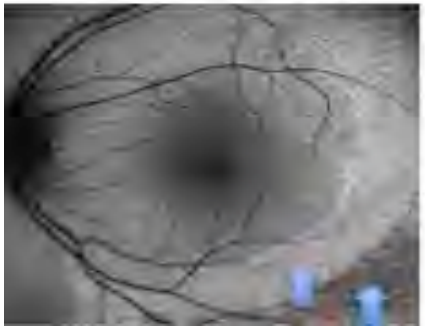
- High dose and long duration of use are the most significant risks.
  - Other major factors are concomitant renal disease, or use of tamoxifen
- A baseline fundus examination should be performed to rule out preexisting maculopathy.
- Begin annual screening after 5 years for patients on acceptable doses and without major risk factors.

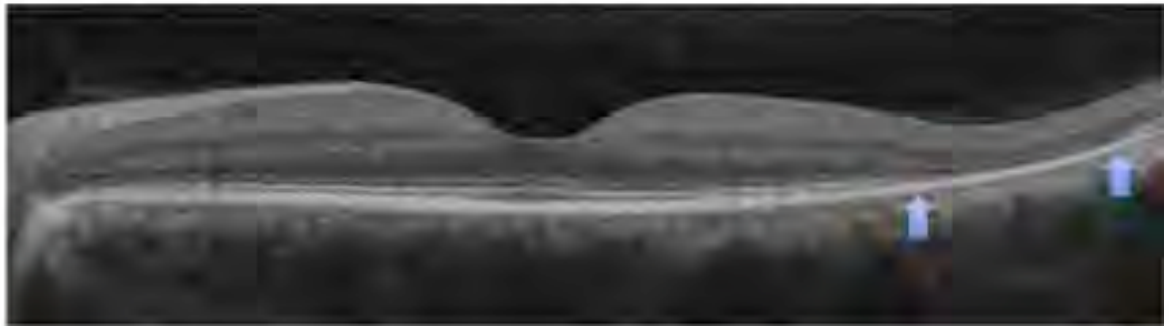
2016 Recommendations

- primary screening tests are automated visual fields plus spectral-domain optical coherence tomography (SD OCT)
- wider test patterns (24-2 or 30-2) are needed for Asian patients in whom toxicity often manifests beyond the macula. These larger patterns have only 4 central test spots, and even a single central spot of reduced sensitivity should be taken seriously.









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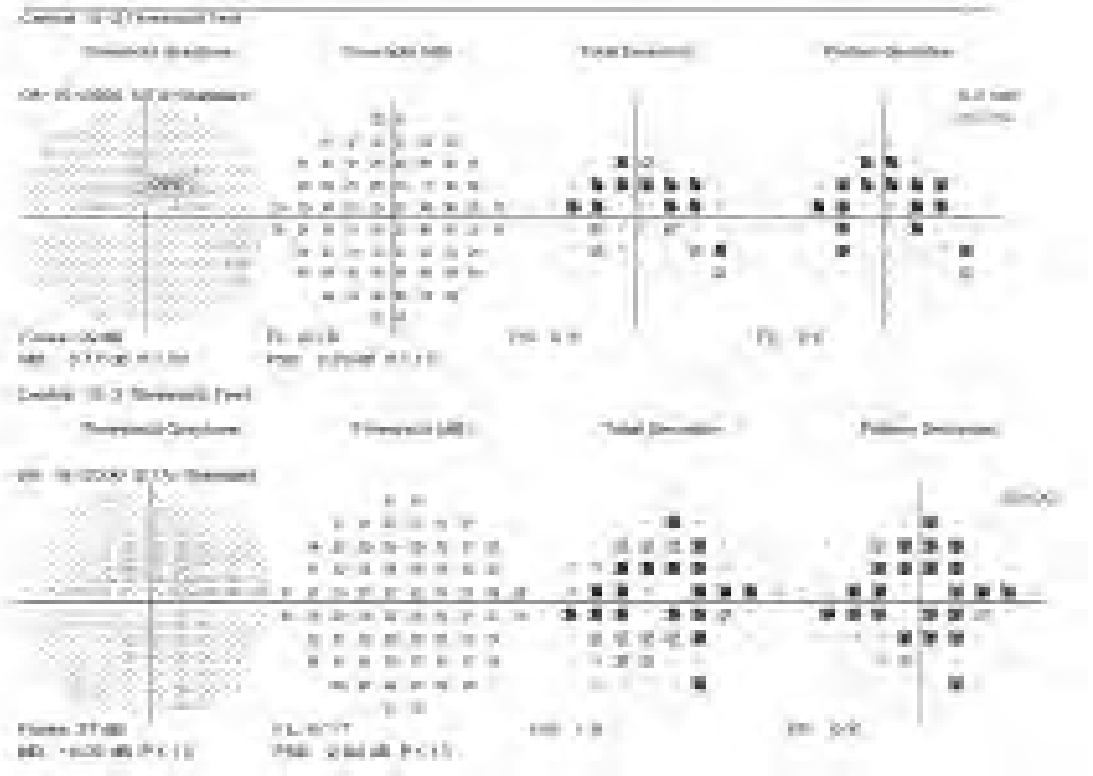
Revised Recommendations on Screening for Retinopathy

- Parafoveal loss of visual sensitivity may appear before changes are seen on fundus evaluation
  - Many instances where retinopathy was unrecognized for years as field changes were dismissed as "non-specific" until the damage was severe
  - 10-2 VF should always be repeated promptly when central or parafoveal changes are observed to determine if they are repeatable
  - Advanced toxicity shows well-developed paracentral scotoma

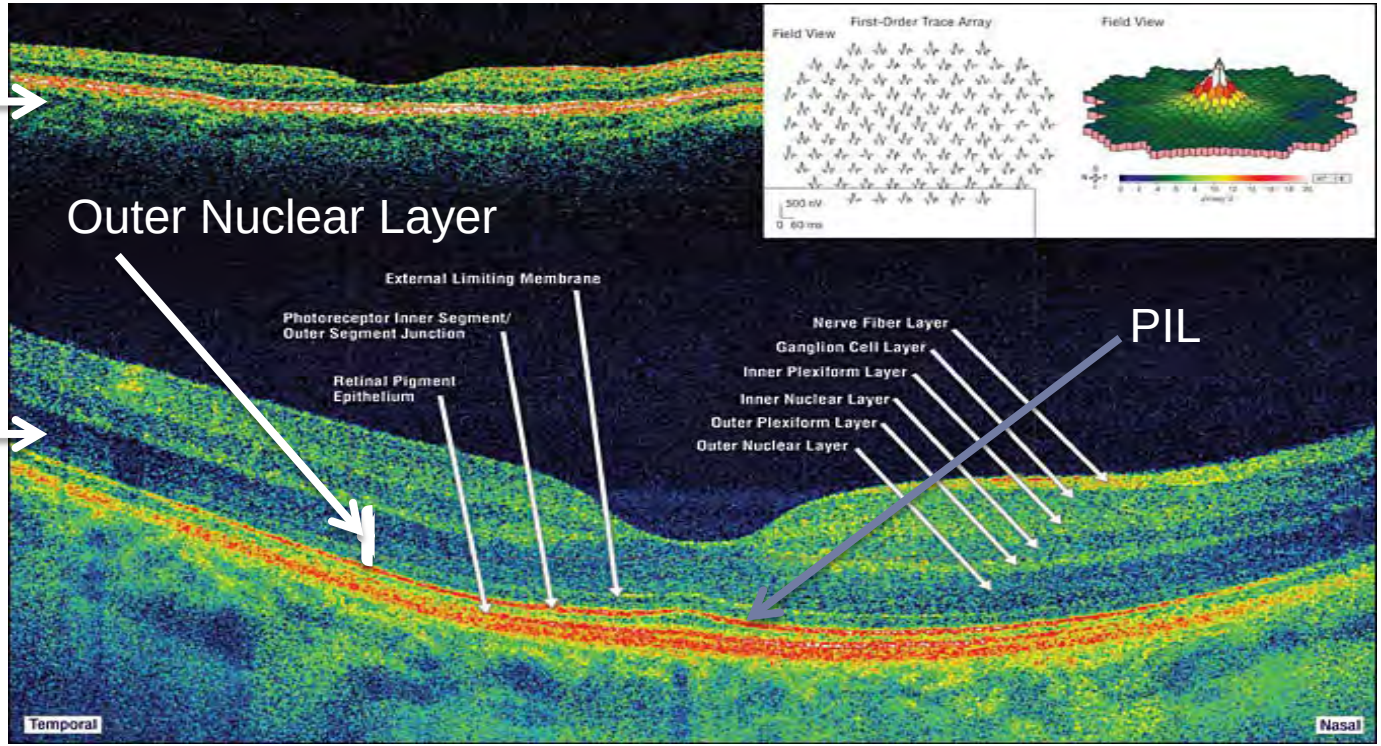
Paracentral Scotomas



Normal Retina: VF/OCT/ERG

TD-OCT

SD-OCT



Rodriguez-Padilla, J. A. et al. Arch Ophthalmol 2007;125:775-780.

ARCHIVES OF OPHTHALMOLOGY

PIL=PR Integrity Line

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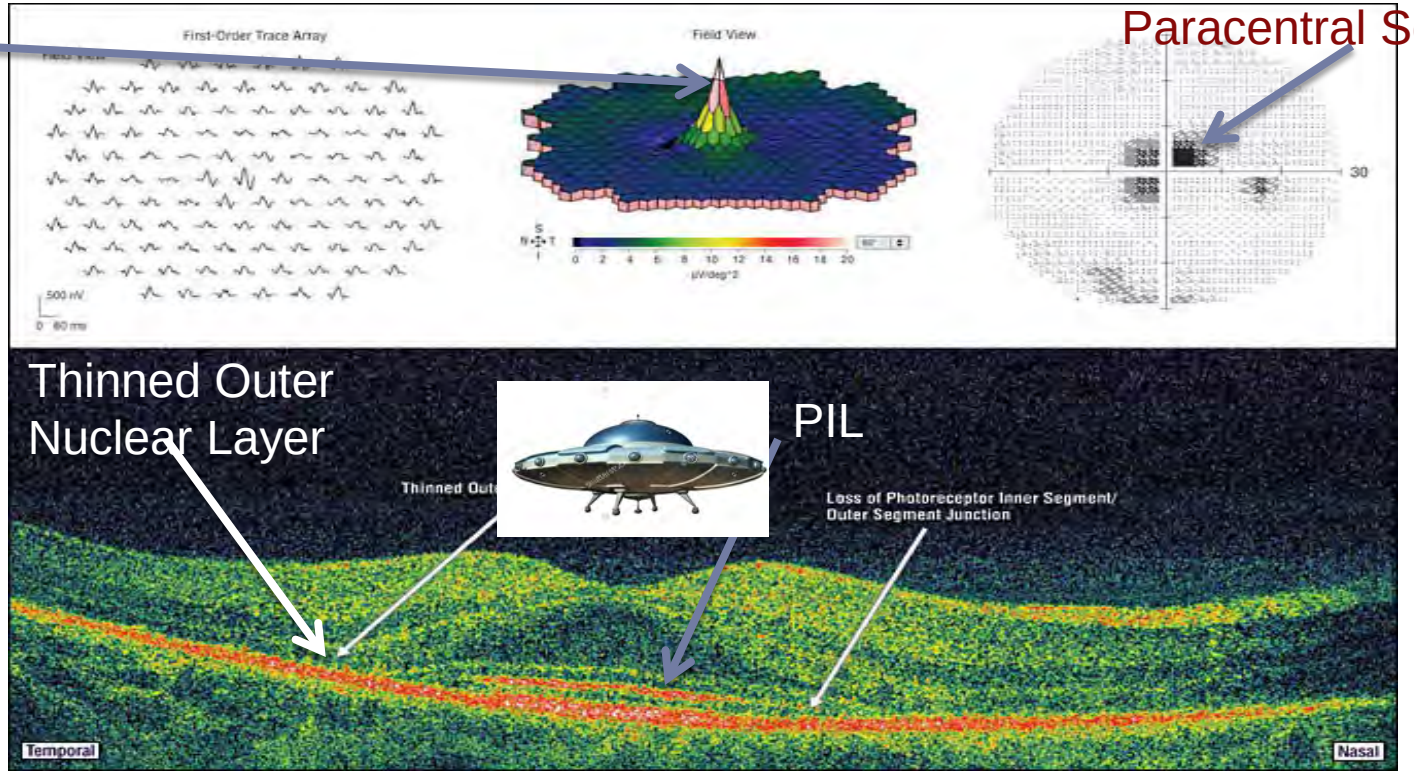
Mild Maculopathy

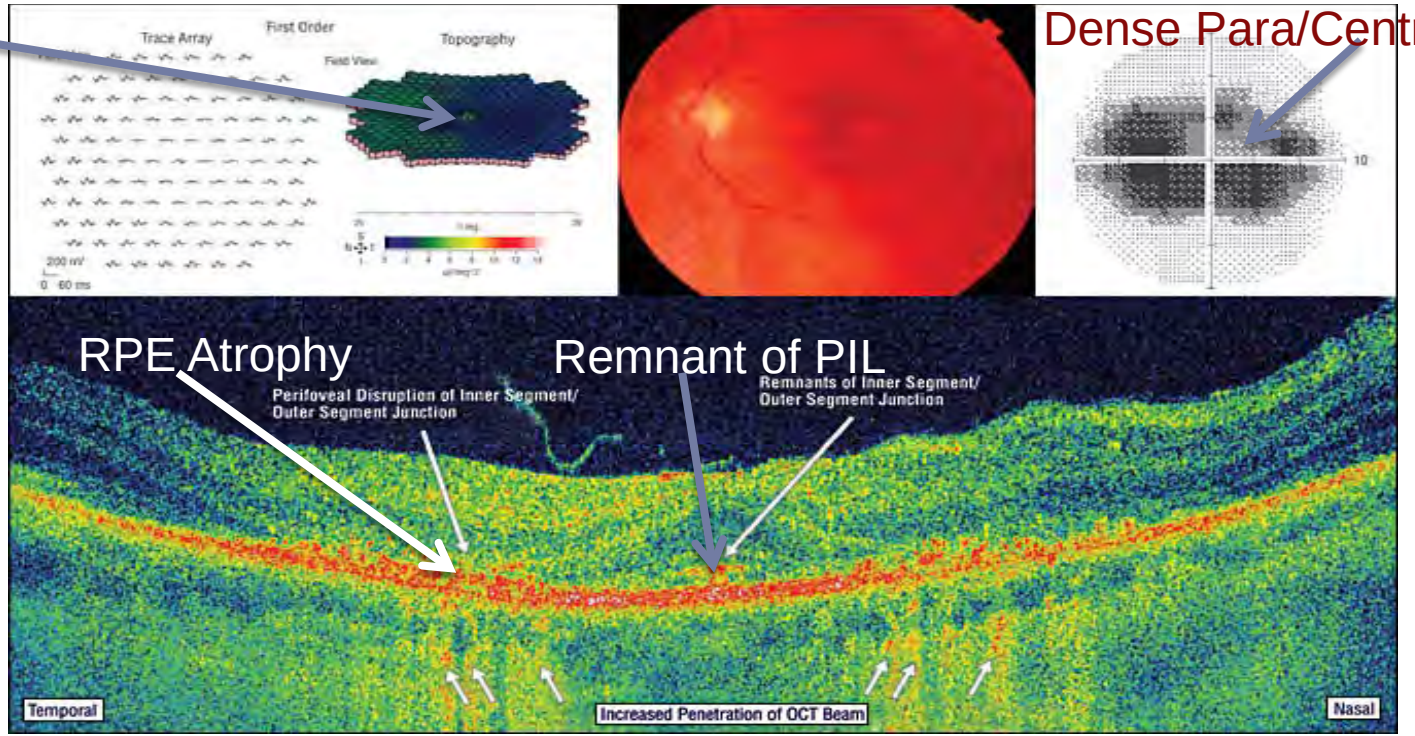
Normal Foveal Peak



Rodriguez-Padilla, J. A. et al. Arch Ophthalmol 2007;125:775-780.

Bull's Eye Maculopathy

Flattened Foveal Peak



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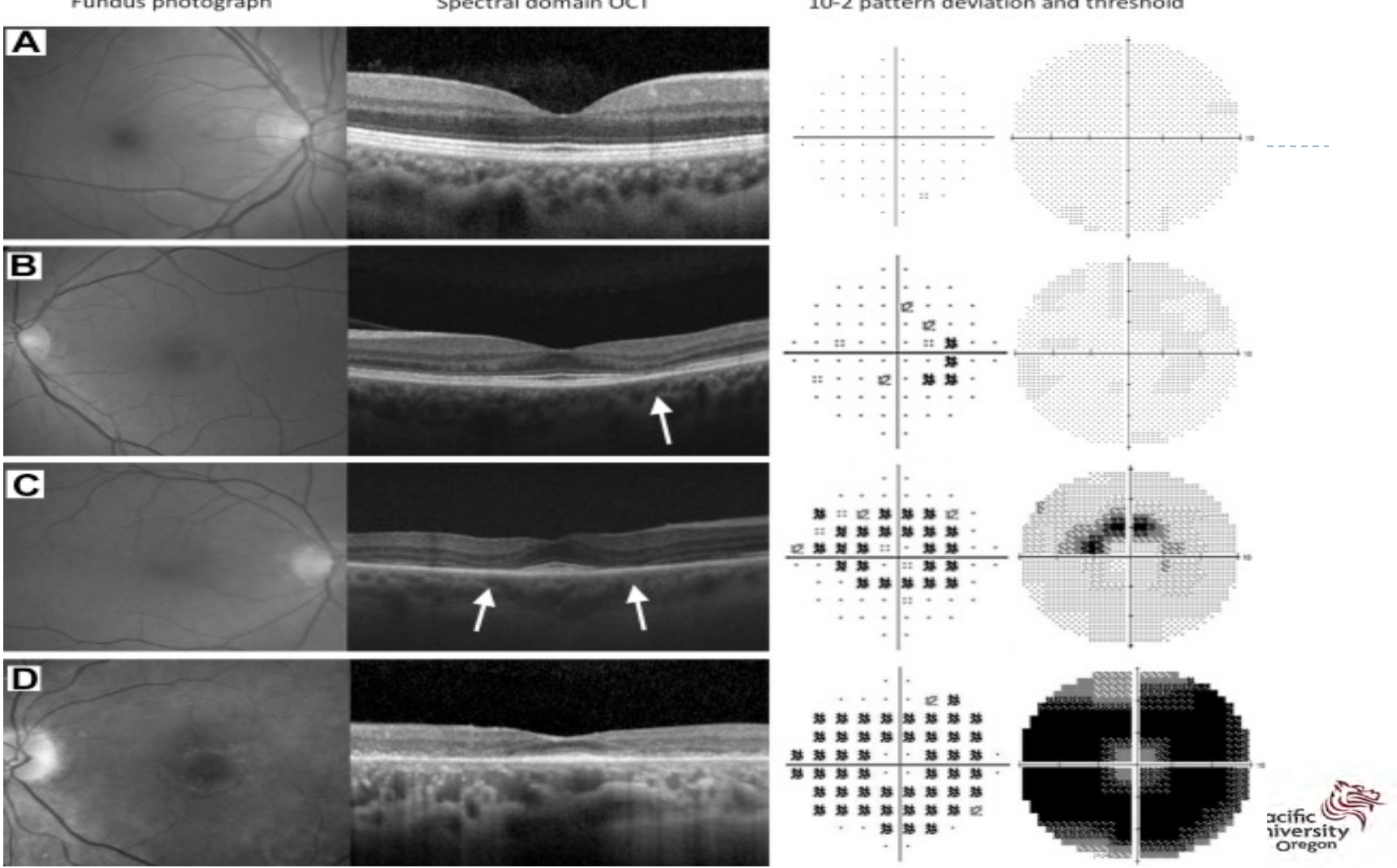
ARCHIVES OF OPHTHALMOLOGY


Fundus photograph
Spectral domain OCT
10-2 pattern deviation and threshold
A
B
C
D

Major Risk Factors

Table 1. Major Risk Factors for Toxic Retinopathy

Daily dosage	
HCQ	>5.0 mg/kg real weight
CQ	>2.3 mg/kg real weight
Duration of use	>5 Yrs, assuming no other risk factors
Renal disease	Subnormal glomerular filtration rate
Concomitant drugs	Tamoxifen use
Macular disease	May affect screening and susceptibility to HCQ/CQ

CQ = chloroquine; HCQ = hydroxychloroquine.

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Screening Recommendations

Table 2. Screening Frequency

Baseline Screening
Fundus examination within first year of use
Add visual fields and SD OCT if maculopathy is present
Annual Screening
Begin after 5 yrs of use
Sooner in the presence of major risk factors

SD OCT = spectral-domain optical coherence tomography.

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30 YR WM

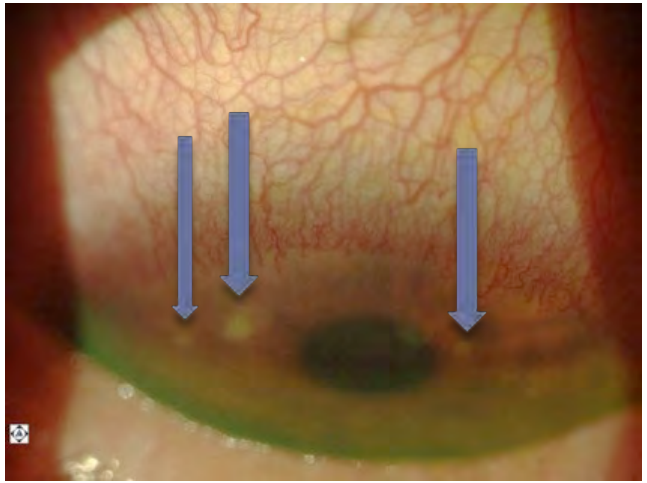
- Patient calls from his PCP office asking if we can see him today because he has had red/painful eyes for over a week and has not resolved
- Medical history:
  - Past week has been experiencing painful urination and discharge
  - New sexual partner apprx 10 days ago, who also had developed a red eye
  - Chlamydia and gonorrhea testing were negative
  - Has tested positive for HSV2 but no current flare up

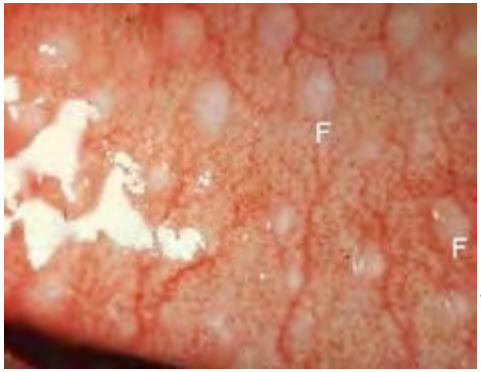
30 YO WM

- Medications:
  - In the past week patient:
    - 2 courses of azythromycin (1 gram each)
    - Injection of rocephin
    - Injection of penicillin G
    - Currently taking doxycycline 100 mg bid
    - Valtrex 1 gram 3 times per day for 7 days (d/c 1 day ago)
    - Was on Vigamox qid for 7 days (d/c 1 day ago)
- VA: 6/7.5 (20/25) OD, OS
- Entrance skills unremarkable though some pain on eye movement

30 YO WM

- SLE:
  - 2+ injection conjunctival both eyes
  - 1-2+ lid edema
  - Mixed papillary and follicular response
  - 1-2+ diffuse SPK (no staining noted above infiltrates)
  - No cells or flare noted





30 YO WM

- AdenoPlus:
  - Performed on the right eye (patient felt that was the worst eye)
  - Negative

30 YO WM

- Started patient on the miracle drop
  - Tobradex 4 times per day and scheduled patient to come back the next day
- 1 day f/u
  - Patient was feeling better
  - Less redness and much reduced photophobia and discomfort
  - No improvement on painful urination or discharge and is now seeing blood in his urine
  - Continue tobradex 4 times per day and RTC in 4 days for f/u with dilation and told to contact PCP to update on the blood in the urine

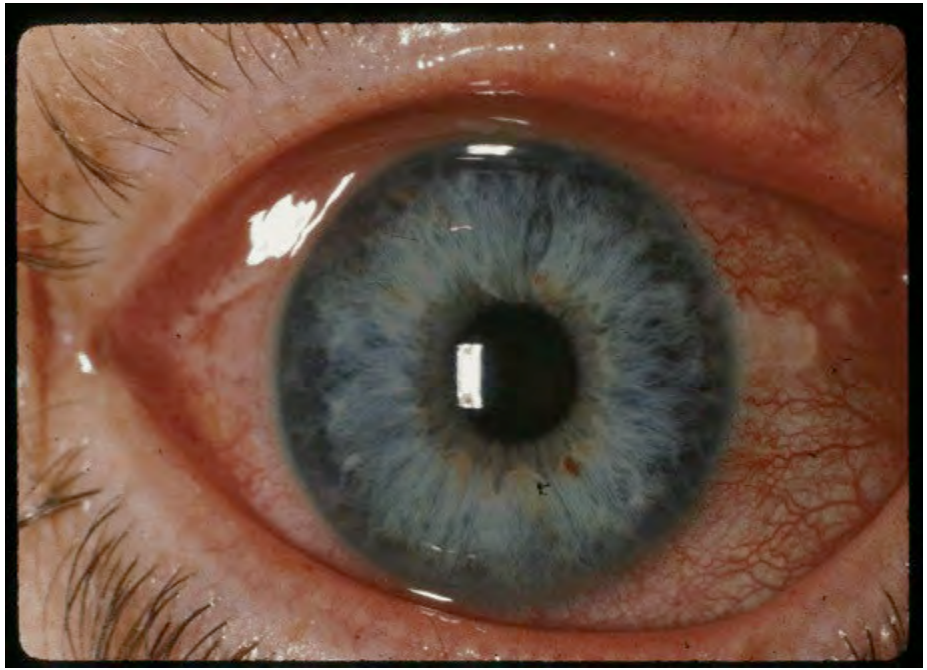
30 YO WM

- 4 day f/u:
  - Patient says his eyes are doing great and that all of his urogenital problems abruptly stopped on Saturday
  - Discussion with PCP: Kidney stone
  - What was going on with the eye?
    - Viral conjunctivitis likely EKC

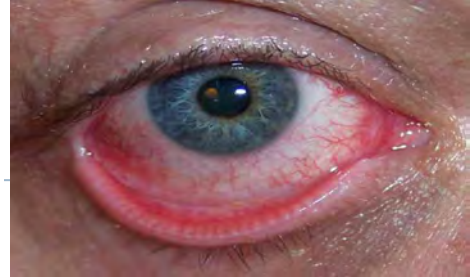
What did we learn from this?

Viral Conjunctivitis

- Most common infectious keratitis presenting on emergent basis
- 62% caused by adenovirus
- Two major types:
  - Pharyngoconjunctival fever (PCF)
  - Epidemic keratoconjunctivitis (EKC)

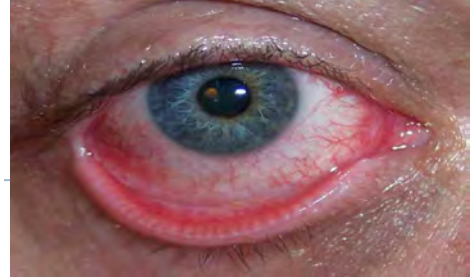


Viral Conjunctivitis



- PCF: history of recent/current upper respiratory infection
  - classic triad of fever, pharyngitis, and acute follicular conjunctivitis.
  - occurs more commonly in children, is caused by serotypes 3 and 7, and is spread by respiratory secretions.
  - tearing and foreign body sensation that is initially unilateral.

Viral Conjunctivitis



- PCF:
  - corneal involvement is not a key feature, there is occasionally a punctate keratitis;
  - SEIs are rare.
  - self-limiting condition that varies in severity and may last from 4 days to 2 weeks
  - Treatment if symptomatic though topical steroids are rarely needed.

Viral Conjunctivitis: EKC (Epidemic Keratoconjunctivitis)

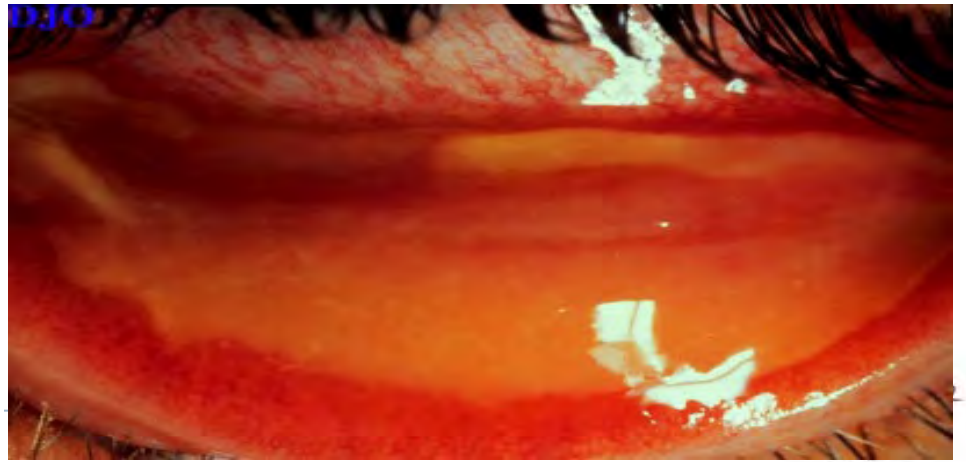
- EKC initially manifests as a flu-like syndrome consisting of fever, malaise, and myalgias followed by the appearance of ocular signs and symptoms, including a red eye, eyelid edema, excessive tearing, irritation, foreign body sensation, and photophobia.
- EKC frequently begins as a unilateral condition but, in 70% of cases, will become bilateral within the first week of symptoms as a result of hand-to-eye transmission
  - Adenovirus 8 common variant leading to "rule of 8's"
    - First 8 days red eye with fine SPK
    - Next 8 days deeper focal epithelial lesions
    - Following 8 potential development of infiltrates
    - Resolution

https://www.aao.org/eyenet/article/epidemic-keratoconjunctivitis-prevention-strategie

Viral Conjunctivitis: Signs and Symptoms

- Gritty sensation
- Watery discharge
- Sticky in mornings
- ***Follicular response***
- Chemosis
- Injection
- SPK
- Infiltrates possible
- Positive lymph nodes

- ***Pseudomembranes in severe cases***
- Subconjunctival hemes



Management

- Considering the use of anti-inflammatory treatment to relieve patient symptoms and improve comfort??
  - E.g. Lotemax^{R} QID OU
- EKC patients are typically very uncomfortable and would benefit from anti-inflammatory treatment
  - especially if infiltrates or pseudomembrane present
- studies have shown that steroids are effective in reducing inflammation during the acute phase of EKC and decreasing the likelihood of development of corneal subepithelial infiltrates.
- However, the studies also showed that their use increased viral replication and titers and prolonged the mean duration of viral shedding
- routine corticosteroid use is generally not indicated for EKC
  - when managing a severe EKC inflammation, you should carefully weigh the risks and benefits of steroids

https://www.aao.org/eyenet/article/epidemic-keratoconjunctivitis-prevention-strategie

Management

- Betadine (Melton-Thomas Protocol):
  - Proparacaine
  - 4-5 drops of Betadine 5%
    - Get patient to close eye and gently roll them around
  - After one minute, lavage the eye
  - Lotemax 4 times a day for 4 days
- Alternative: Betadine swabsticks.
  - 5% Betadine solution only comes in 30 ml bottles cost $14.00.
  - Case of 200 Betadine swabsticks apprx. 45 dollars.

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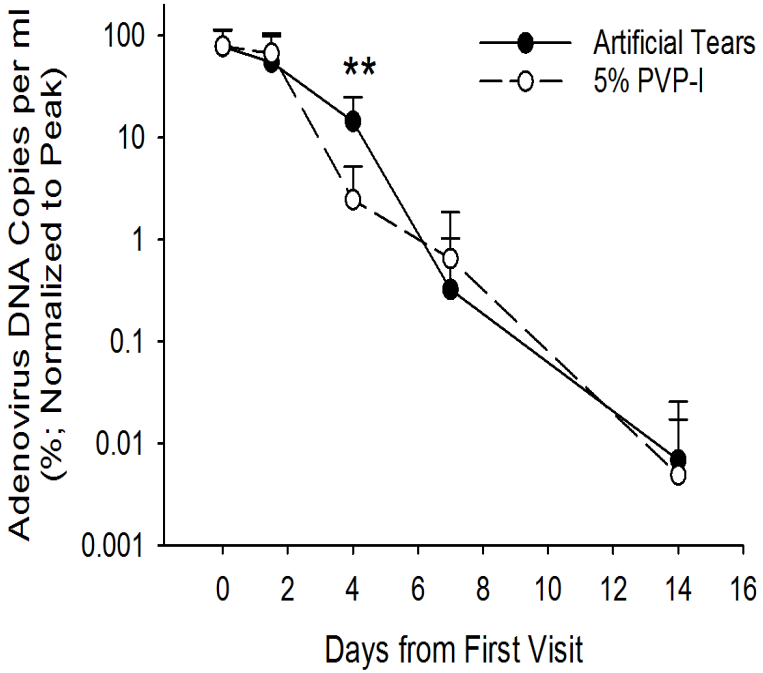
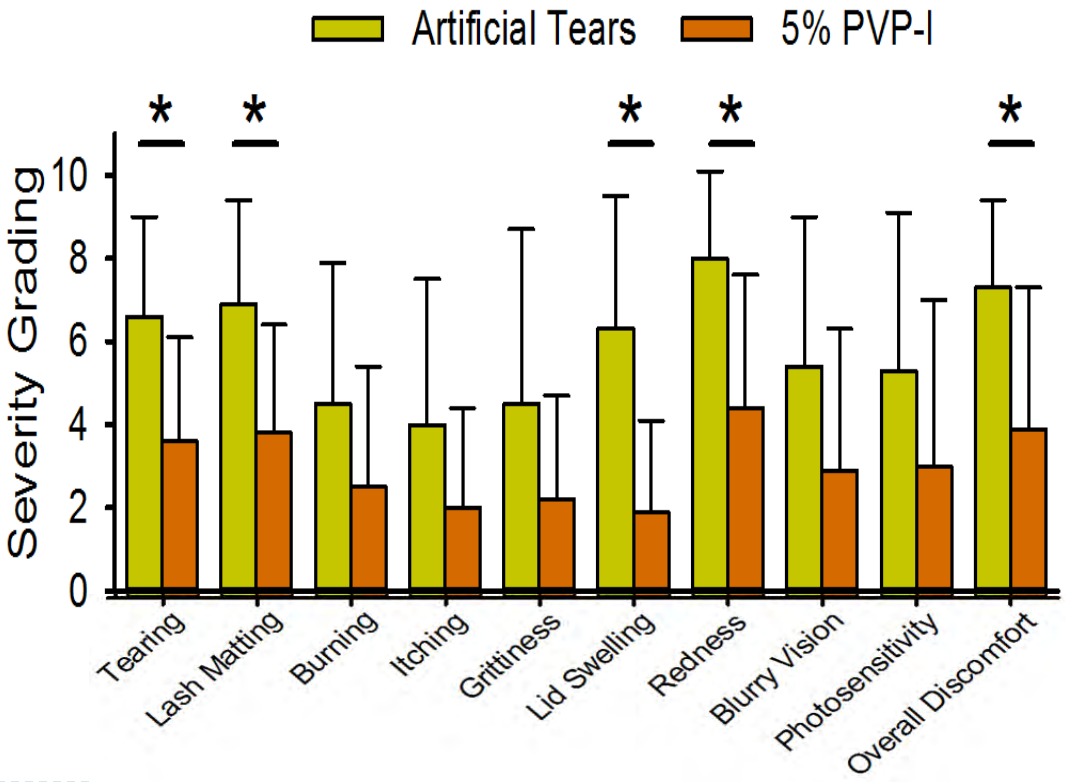
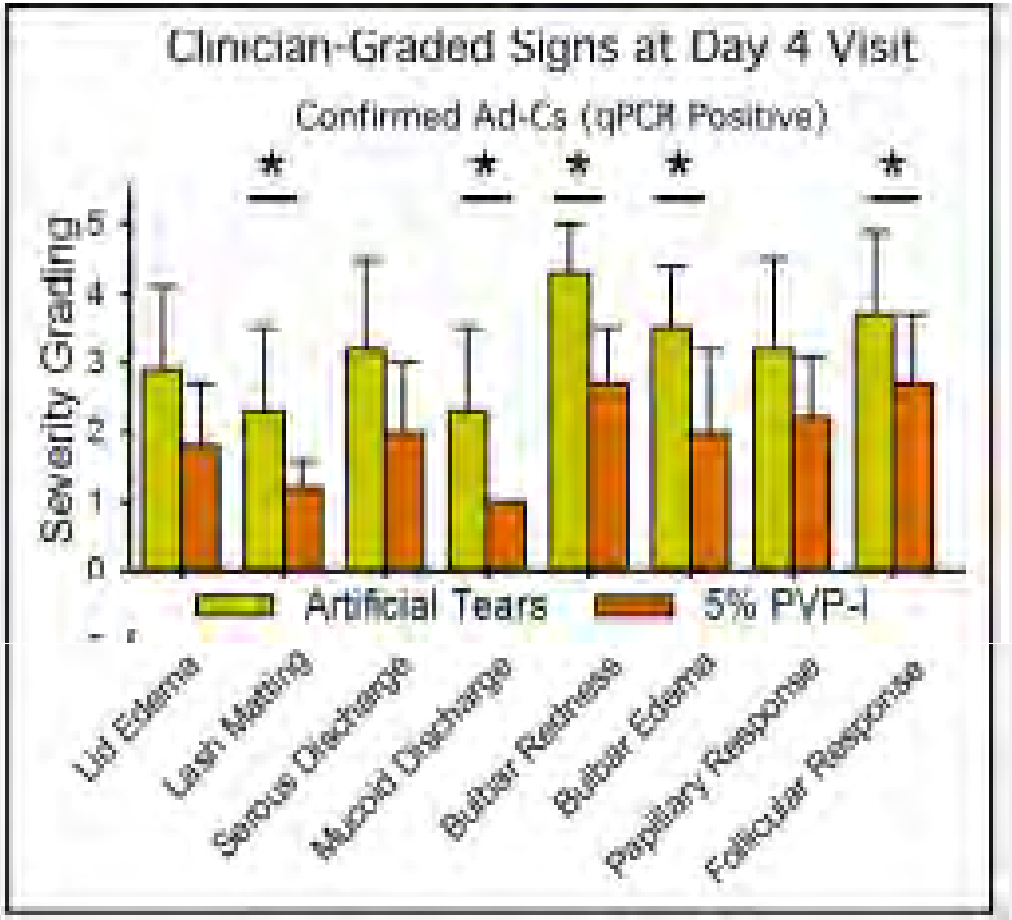
Reducing Adenoviral Patient-Infected Days (RAPID) Study

Effect of 5% PVP-I on qPCR-Derived Viral Titers



Day 4: qPCR + Participant-Reported Symptoms




Clinician-Graded Signs at Day 4 Visit
Confirmed Ad-Cs (qPCR Positive)
Severity Grading
0
1
2
3
4
5
*
*
*
*
*
Artificial Tears
5% PVP-I
Lid Edema
Lash Matting
Serous Discharge
Mucoid Discharge
Bulbar Redness
Bulbar Edema
Papillary Response
Follicular Response

Management

- Antivirals used in HSV keratitis have traditionally thought to be ineffective in treatment of viral conjunctivitis
  - Ganciclovir: In a double-masked, controlled, and randomized study it was found to shorten the mean time of recovery from 18.5 days to 7.7 days in patients who were treated vs. those who just received artificial tears.
    - Tabbara K, Jarade E. Ganciclovir effects in adenoviral keratoconjunctivitis. 2001; ARVO abstract 3111 (suppl); S579
  - In clinical trial Avenova[R]: proposed end date November 2020
    - **The investigators propose a study to evaluate the role of Avenova® (0.01% hypochlorous acid) in the treatment of common ocular viral infections.**
- Important to stress limited contact with others, frequent hand washing, not sharing of towels, etc.

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Efficacy of Hospital Germicides against Adenovirus 8, a Common Cause of Epidemic Keratoconjunctivitis in Health Care Facilities. ANTIMICROBIAL AGENTS AND CHEMOTHERAPY, Apr. 2006, p. 1419–1424

An important finding from our study was that of the four disinfectants recommended by the CDC and Association for Professionals in Infection Control and Epidemiology for elimination of adenovirus type 8 from ophthalmic instruments, two **(70% isopropyl alcohol and 3% hydrogen peroxide) were found to be ineffective**. Based on these data, 3% hydrogen peroxide and 70% isopropyl alcohol are not effective against adenovirus that is capable of causing epidemic keratoconjunctivitis and similar viruses and should no longer be used for disinfecting applanation tonometers.

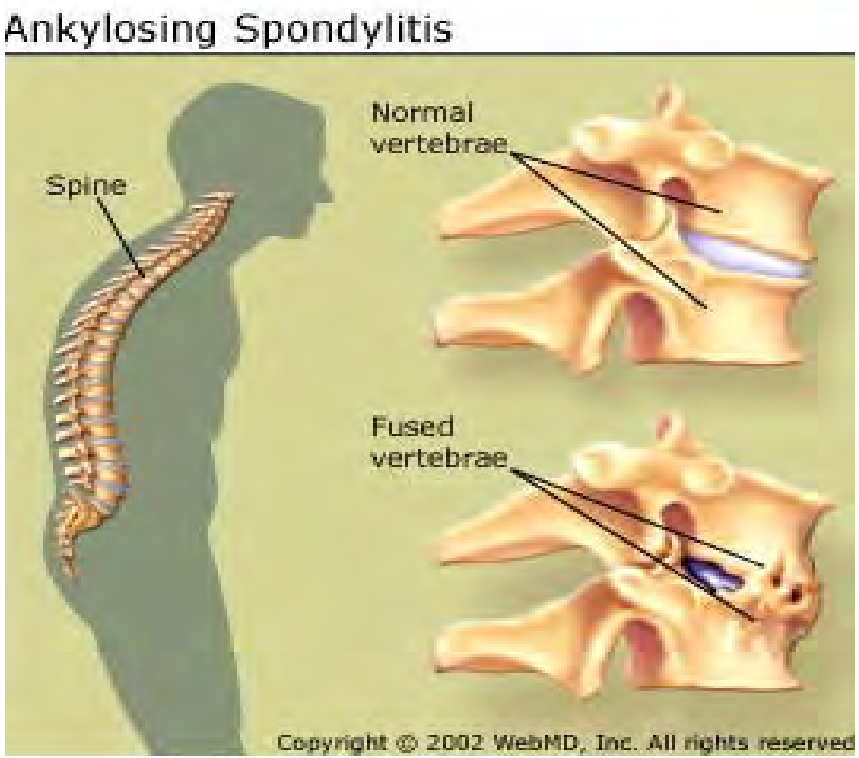
EKC Disinfection

- Commercial grade disinfectants that include compounds such as:
  - peracetic acid,
  - aldehydes [glutaraldehyde and ortho-phthalaldehyde],
  - chlorine-based products [1,900 to 6,000 ppm available free chlorine],
  - ethanol mixed with quaternary ammonium compounds)
- E.g. Cidex, DisCide

HLA-B27 Conditions

Ankylosing Spondylitis

- Ankylosing spondylitis is a type of arthritis that affects the spine:
  - symptoms include pain and stiffness from the neck down to the lower back.
- The vertebrae may grow or fuse together, resulting in a rigid spine.
  - these changes may be mild or severe, and may lead to a stooped-over posture.



Ankylosing Spondylitis

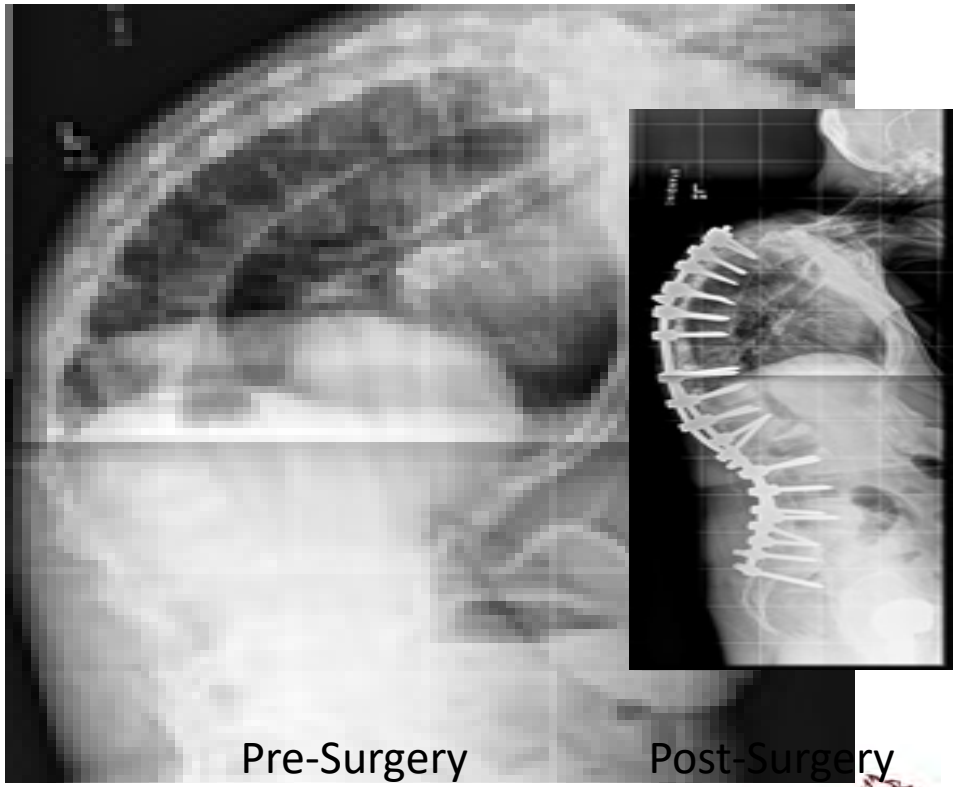
- Ankylosing spondylitis affects about 0.1% to 0.5% of the adult population.
- Although it can occur at any age, spondylitis most often affects men in their 20s and 30s.
  - It is less common and generally milder in women and most common in Native Americans.
- Early diagnosis and treatment helps control pain and stiffness and may reduce or prevent significant deformity.

Ankylosing Spondylitis

- Physical Exam:
  - The overall points taken into account when making an AS diagnosis are:
    - Onset is usually under 35 years of age.
    - Pain persists for more than 3 months (i.e. it is chronic).
    - The back pain and stiffness worsen with immobility, especially at night and early morning.
    - The back pain and stiffness tend to ease with physical activity and exercise.
    - Positive response to NSAIDs (nonsteroidal anti-inflammatory drugs).

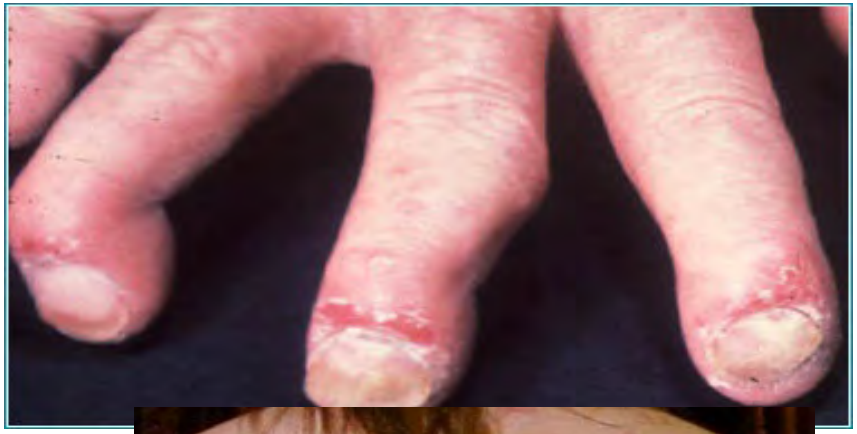
Ankylosing Spondylitis

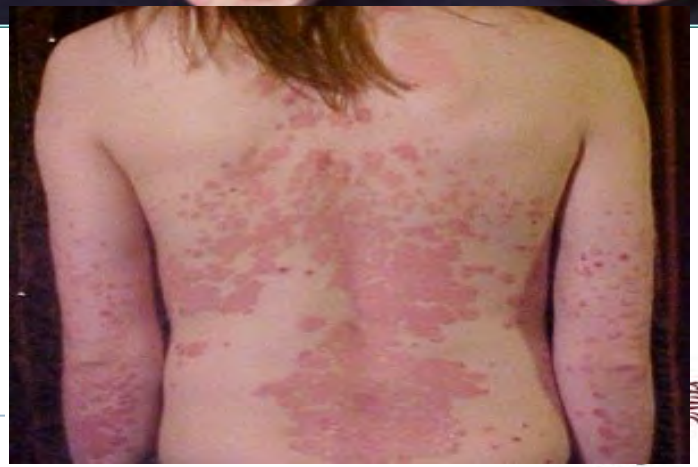
- X-rays:
  - The hallmark of AS is involvement of the sacroiliac (SI) joint
  - show erosion typical of sacroiliitis (inflammation of the sacroiliac joints).
  - can take 7 to 10 years of disease progression for the changes in the SI joints to be serious enough to show up in conventional x-rays.



Psoriatic Arthritis

- Psoriasis is a scaly rash that occurs most frequently on the elbows, knees and scalp, but can cover much of the body.
- It is a chronic, inflammatory disease of the skin, scalp, nails and joints.





Psoriatic Arthritis

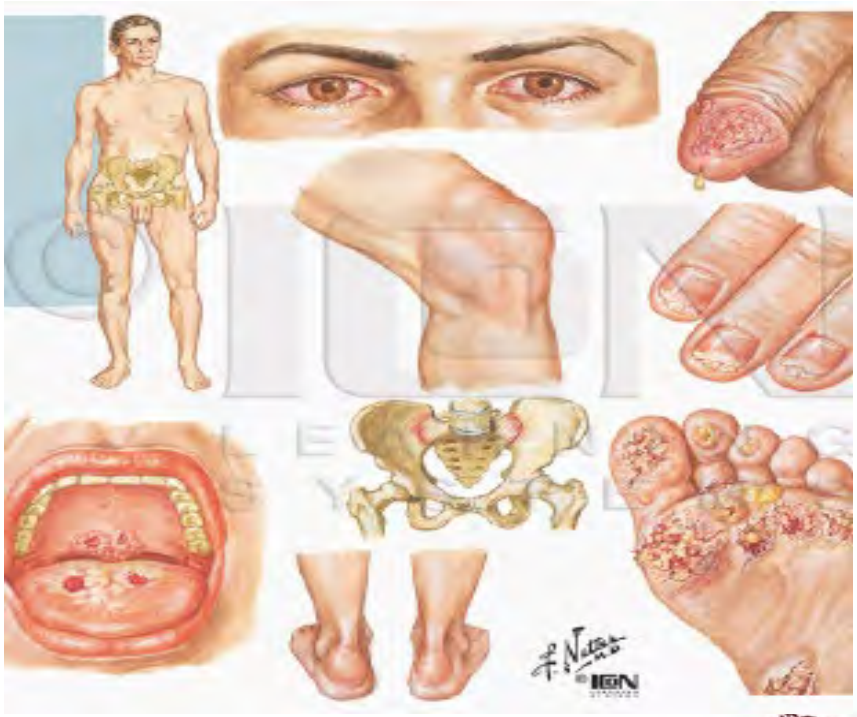
- In 5-10% of those with psoriasis, arthritis also appears.
  - In most cases the psoriasis will precede the arthritis, sometimes by many years.
- When arthritis symptoms occur with psoriasis, it is called psoriatic arthritis (PsA).
  - the joints at the end of the fingers are most commonly affected causing inflammation and pain, but other joints like the wrists, knees and ankles can also become involved.
  - usually accompanied by symptoms of the fingernails and toes, ranging from small pits in the nails to nearly complete destruction and crumbling as seen in reactive arthritis or fungal infections.

Psoriatic Arthritis

- About 20% of people who develop PsA will eventually have spinal involvement, which is called psoriatic spondylitis.
- The inflammation in the spine can lead to complete fusion - as in ankylosing spondylitis - or skip areas where, for example, only the lower back and neck are involved.
- Those with spinal involvement are most likely to test positive for the HLA-B27 genetic marker.
- Up to 40% of people with PsA have a close relative with the disease, and if an identical twin has it, there is a 75% chance that the other twin will have PsA as well.

Reactive Arthritis

- Reactive Arthritis (formerly known as Reiter's Syndrome) is a form of arthritis that can cause inflammation and pain in the:
  - joints, the skin, the eyes, the bladder, the genitals and the mucus membranes.
- Reactive arthritis is thought to occur as a "reaction" to an infection that started elsewhere in the body, generally in the genitourinary or gastrointestinal tract.



Reactive Arthritis

- Reactive arthritis occurs after exposure / infection caused by certain types of bacteria. These include:
  - Chlamydia
  - Bacteria such as Salmonella, Shigella, Yersinia or Campylobacter, which occurs after eating spoiled or contaminated food.
- Not everyone exposed to these bacteria will contract ReA.
  - Those who go on to develop ReA tend to test positive for the HLA-B27 genetic marker, although other genetic factors may be involved.
  - Thus, it is an interaction between an individual's genetic make-up and the initial infection that causes Reactive Arthritis.

Reactive Arthritis

- ReA usually develops 2-4 weeks after the infection.
- A tendency exists for more severe and long-term disease in patients who do test positive for HLA-B27 as well as those who have a family history of the disease.
- Reactive Arthritis typically follows a limited course, where symptoms subsiding in 3-12 months.
  - However, the condition has a tendency to recur.
- About 15-20% of people with ReA develop a chronic, and sometimes severe, arthritis or spondylitis.

ReA Conjunctivitis

- Eye involvement occurs in about 50% of men with urogenital reactive arthritis and about 75% of men with enteric reactive arthritis.
- Conjunctivitis and uveitis can include redness of the eyes, eye pain and irritation, or blurred vision.
- Eye involvement typically occurs early in the course of reactive arthritis, and symptoms may come and go
- Treatment includes NSAIDs and/or steroids

Enteropathic Arthritis

- Enteropathic arthritis is a form of chronic, inflammatory arthritis associated with the occurrence of an inflammatory bowel disease (IBD):
  - the two best-known types of which are ulcerative colitis and Crohn's disease.
- About one in five people with Crohn's or ulcerative colitis will develop enteropathic arthritis.
- The most common areas affected by enteropathic arthritis are inflammation of the peripheral (limb) joints, as well as the abdominal pain and possibly bloody diarrhea associated with the IBD component of the disease.
- In some cases, the entire spine can become involved as well.

Enteropathic Arthritis

- The course and severity of enteropathic arthritis varies from person to person.
- The disease "flares" - the times when the disease is most active and inflammation is occurring - tend to be self-limiting, often subsiding after 6 weeks, but reoccurrences are common.
- In some cases the arthritis may become chronic and destructive.

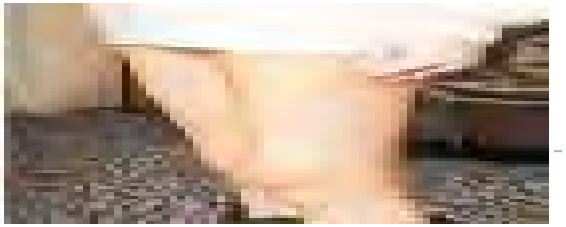
Juvenile Rheumatoid Idiopathic Arthritis (JRA/JIA)

- "Rheumatoid like" disease with onset before age 17
- Group of arthritides responsible for significant functional loss in children
- Most common chronic disease with genetic predisposition in children.
- 2:1 female:male, with peak incidence b/w 2-4 and then 10-12

Natural History

- Pathogenesis unknown
- Immune-mediated activity directed towards Type II collagen
- RF mediated responses rarely found
- 1^{o} involves weight bearing joints of lower extremities (knees/ankles) as well as joints of elbows/hands
- Little associated pain/tenderness observed

Diagnosis



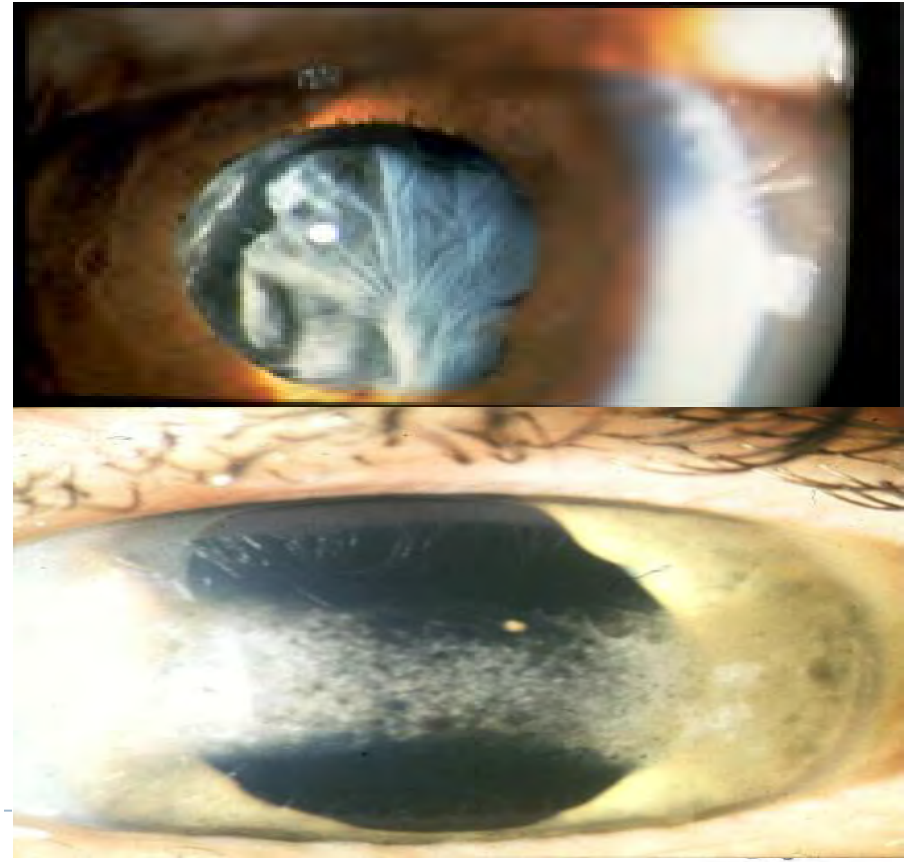
- Synovitis that persists essential criterion for diagnosis.
- Hematologic and radiographic studies are beneficial in diagnosis and classification.
- Fewer than 20% of patients have positive RF
- Radiographic evaluation of inflamed joints reveal soft tissue swelling and peri-articular osteoporosis with possible new bone formation.
- Loss of the cartilaginous space with erosions occur after long duration.

Ocular Manifestations

- Classic triad of iridocyclitis, cataract and band keratopathy
- Overall incidence of iridocyclitis is apprx 20%.
- Cataract, glaucoma, and band keratopathy are seen in 50% of patients who develop persistent iridocyclitis.

Ocular Manifestations

- Severe vision loss results primarily from cataract formation and less frequently from band keratopathy.
- Insidious onset of ocular involvement, with the iridocyclitis commonly following the arthritis symptoms (though occasionally preceding)
- Patients are often asymptomatic and therefore require ocular evaluation for detection



Ocular Manifestations

- Evidence of chronic iridocyclitis may be presenting sign leading to Dx of JIA
- Posterior segment involvement is not commonly seen
- Band keratopathy in children <16 is pathognomonic for JIA
  - results from aggressive/chronic ocular inflammation (not abnormal calcium metabolism).
- JIA patients do not present with the dry eye and K sicca manifestations that are so prevalent in RA.

Treatment and Management-Ocular

- Systemic medical therapy has minimal effect on ocular inflammation
- Topical steroids and short acting cycloplegics remain primary treatment
- Decreased VA 2º to cataract requiring extraction
- Band keratopathy develops in eyes with chronic iridocyclitis and require treatment with chelating agents
- Patients who develop glaucoma need to be treated aggressively