



1

### Disclosures:

- Sun Pharmaceuticals: speakers bureau,
- AbbVie: advisory board
- Apellis: speakers bureau
- Tarsus: advisory board
- All financial relationships have been mitigated.



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### 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



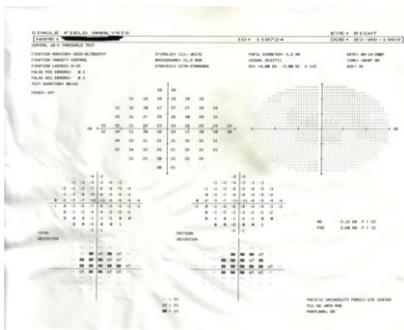
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### Entrance Skills

- 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)

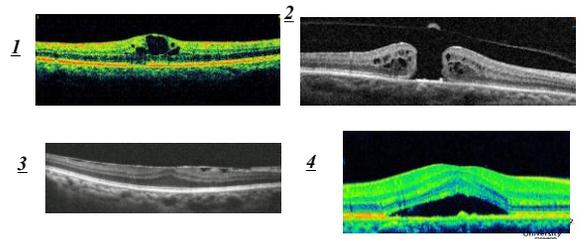


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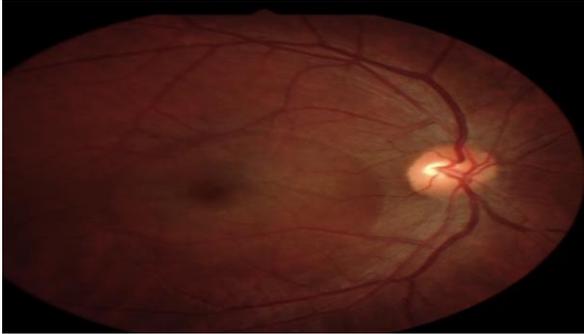


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Which of the following OCT's goes with this patient?



6



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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



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## 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%



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## 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



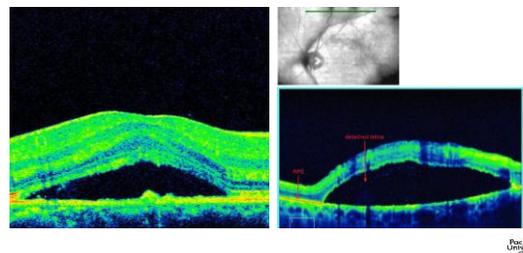
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## Central Serous Retinopathy



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## CSR versus RD



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## 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 paresthasias, 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



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## 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



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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



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## 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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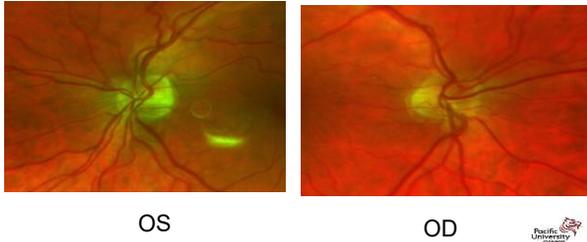
## Health Assessment

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



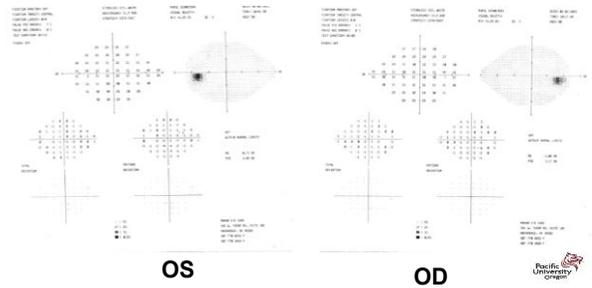
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### Optic Nerves



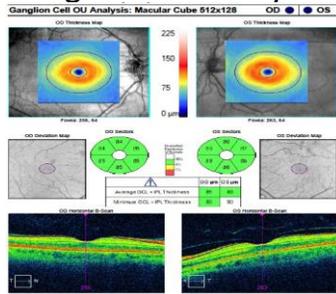
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### Visual Fields



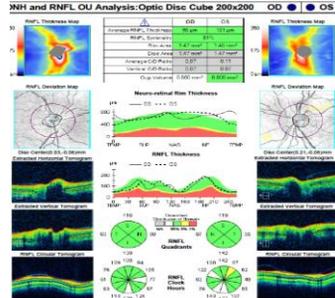
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### Ganglion Cell Analysis



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### RNFL and ONH Analysis



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### Patient Update

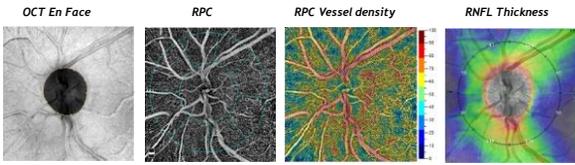
- Patient was seen a year later
- Latanoprost qhs (remembers 5 days out of week)
- IOP's: OD: 14 and OS: 13 mm Hg
- No change in OCT

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### The Future of Glaucoma Diagnosis and Management???

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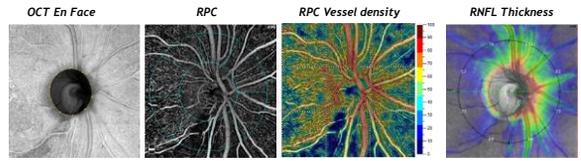
## Normal Eye



Images and data courtesy of Robert Weinreb, MD and Linda Zangwill, PhD, UC San Diego

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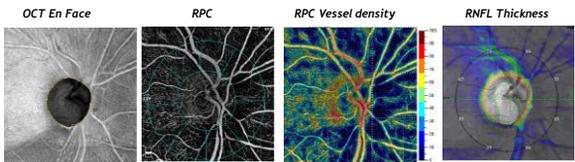
## Moderate Glaucoma



Images and data courtesy of Robert Weinreb, MD and Linda Zangwill, PhD, UC San Diego

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## Advanced Glaucoma



Images and data courtesy of Robert Weinreb, MD and Linda Zangwill, PhD, UC San Diego

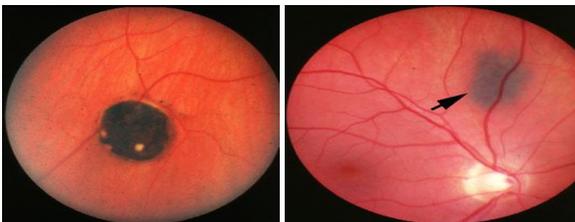
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QUICKIE



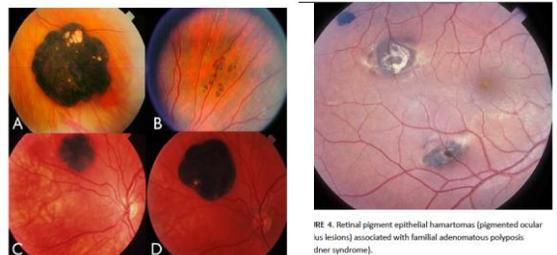
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## CHRPE vs Nevus



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## CHRPE vs Hamartomas



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### 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)



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### TFSOM—“To Find Small Ocular Melanoma”

- Thickness: lesions >2mm
- Fluid: any subretinal fluid (suggestive of serous retinal detachment)
- Symptoms: photopsia, vision loss
- Orange pigment overlying the lesion
- Margin touching optic nerve head (<3mm)
- None of these factors = 3% risk of a nevus converting to melanoma in five years.
- One of these factors = 8% risk of conversion in five years. Two or more factors = 50% risk of conversion in five years. For any changes noted during the course of follow-up, refer the patient to a retinal practice or an ocular oncology service.



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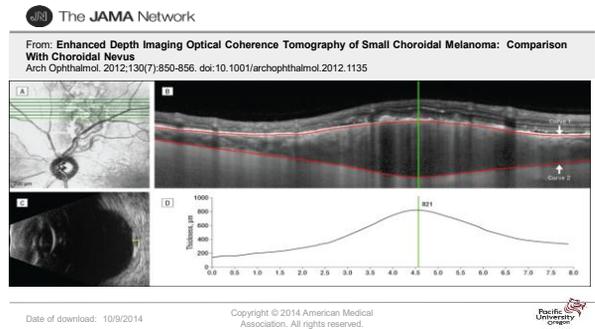
### TFSOM-UHHD:

#### “To Find Small Ocular Melanoma Using Helpful Hints Daily”

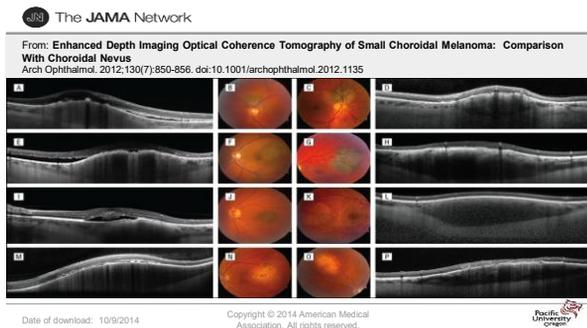
- Thickness: lesions >2mm
- Fluid: subretinal fluid
- Symptoms: photopsia, vision loss
- Orange pigment overlying the lesion
- Margin touching optic nerve head (<3mm)
- Ultrasound Hollowness
- Halo absence
- Drusen absence
- Choroidal nevi showing no features should be initially monitored twice yearly 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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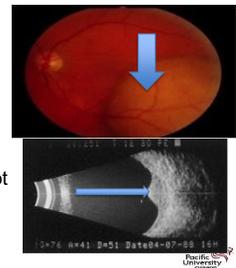
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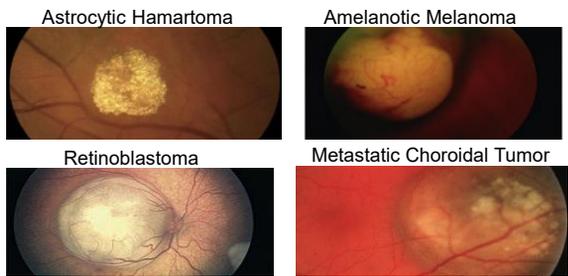
### Case

- 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



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## Ocular Tumors



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## 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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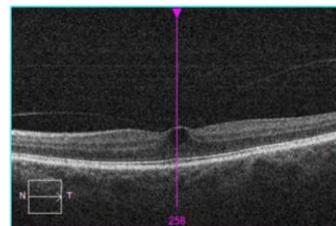
## New Treatment for Choroidal Melanoma

- 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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## What does this look like???



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## Macular hole

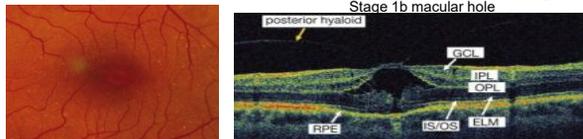
- Unilateral, decreased vision
  - Often in 60-80 year old women
  - Anyone w/ a history of trauma
- Symptoms:
  - Decreased vision, metamorphopsia
    - 20/200 for full thickness holes
- Signs:
  - Red hole in the macula
  - (+) Watzke-Allen sign



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## Macular hole

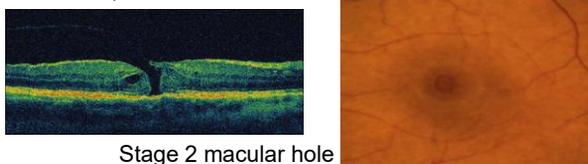
- Stages
  - Stage 1a -> impending hole. Normal foveal depression with yellow spot/dot in fovea.
  - Stage 1b -> Abnormal foveal depression with yellow ring.



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## Macular hole

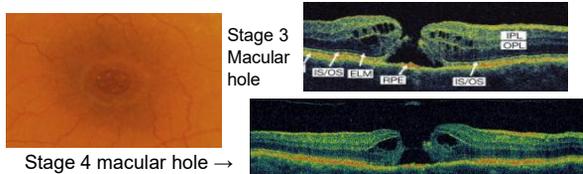
- Stages
  - Stage 2 -> Small full-thickness hole. 20/80 - 20/400.
  - Stage 3 -> Full-thickness hole w/ cuff of SRF. No PVD
  - Stage 4 -> Full-thickness hole with cuff of SRF, with complete PVD.



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## Macular hole

- Stages
  - Stage 2 -> Small full-thickness hole. 20/80 - 20/400.
  - Stage 3 -> Full-thickness hole w/ cuff of SRF. No PVD
  - Stage 4 -> Full-thickness hole with cuff of SRF, with complete PVD.

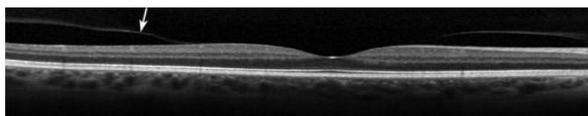


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## New Macular Hole Staging

Table 2. Correlation between Commonly Used Clinical Macular Hole Stages and the International Vitreomacular Traction Study Classification System for Vitreomacular Adhesion, Traction, and Macular Hole

Full-Thickness Macular Hole Stages in Common Use	International Vitreomacular Traction Study Classification System
Stage 0	VMA
Stage 1: impending macular hole	VMT
Stage 2: small hole	Small or medium FTMH with VMT
Stage 3: large hole	Medium or large FTMH with VMT
Stage 4: FTMH with PVD	Small, medium, or large FTMH without VMT

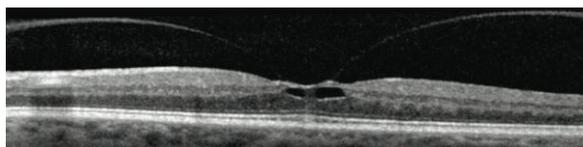


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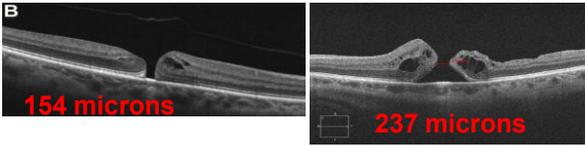
48

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Small FTMH w/o traction



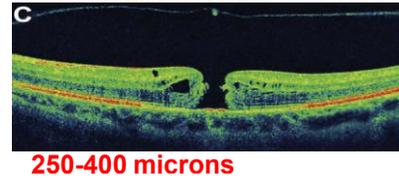
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Stage 3: large hole	Medium or large FTMH with VMT
Stage 4: FTMH with PVD	Small, medium, or large FTMH without VMT

Medium FTMH w/o traction



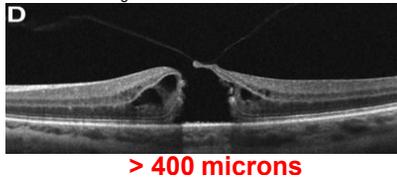
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Stage 4: FTMH with PVD	Small, medium, or large FTMH without VMT

Large FTMH with traction



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## Case

- 65 year old Caucasian patient presents with sudden onset loss/blurring of vision in the right eye
- PMHx: HTN for 15 years, takes “water pill”
- VA’s: 20/60 OD, 20/25 OS
- Pupils: PERRL -APD
- CVF: Inferior defect right eye, no defects noted in the left eye

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## Vision Loss Without Pain:

### Diabetes/Diabetic Retinopathy

- Microvascular complications resulting in capillary closure & abnormal permeability
- S&S include;
  - blurring of vision (maculopathy and refractive error shifts),
  - sudden drop in vision (vitreous heme),
  - dot and blot hemes,
  - exudate,
  - cotton wool spots,
  - neovascularization (iris, retina and disc)

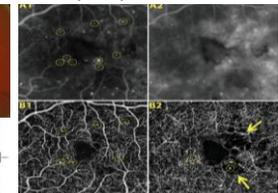
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## Diabetic Retinopathy

CSME (DME)

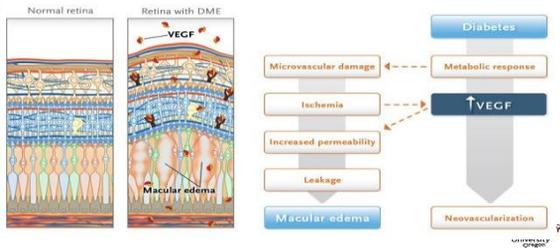


CSME (DME) OCTA



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### VEGF and DME



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### Vision Loss Without Pain: Vein Occlusion

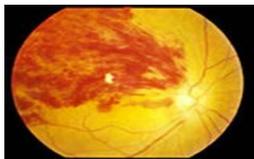
- Associated with:
  - hypertension,
  - coronary artery disease,
  - DM and
  - peripheral vascular disease.
- Usually seen in elderly patients (60-70), slight male and hyperopic predilection.
- Second most common vascular disease after diabetic retinopathy.



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### Branch Retinal Vein Occlusion: Signs/Symptoms

- BRVO: sudden, painless, visual field defect.
  - patients may have normal vision.
  - quadrant VF defect,
  - dilated tortuous retinal veins with superficial hemes and CWS
  - typically occurs at A/V crossing (sup/temp)



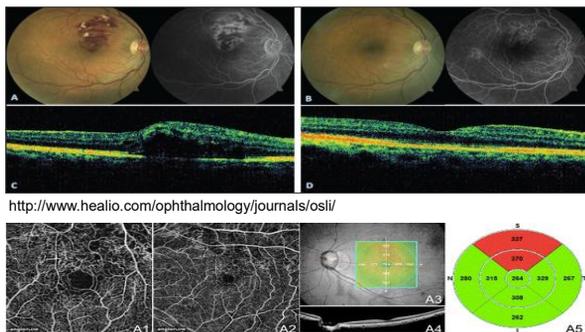
### BRVO

- BRVO more common than CRVO and has more favorable prognosis
  - Overall 50-60% of BRVO patients will maintain VA of 20/40 or better
- Visual loss results from:
  - Macular edema
  - Foveal hemorrhage
  - Vitreous heme
  - Epiretinal membrane
  - RD
  - Macular ischemia
  - Neovascularization complications

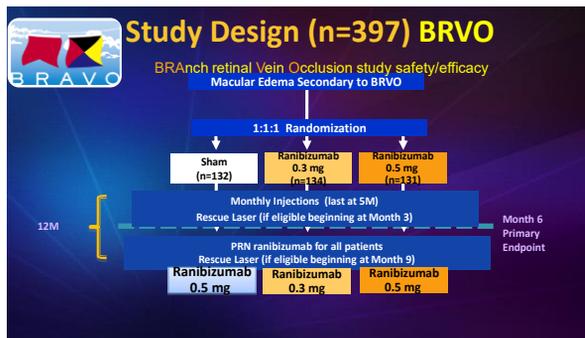


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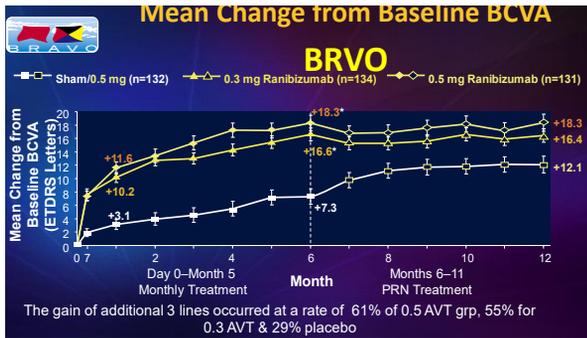
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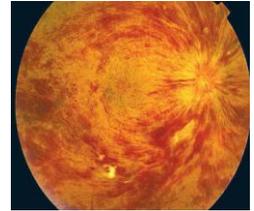
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### Central Retinal Vein Occlusion: Signs/Symptoms

- CRVO: thrombus occurring at lamina is classical theory but new evidence indicates that the occlusion is typically in the optic nerve posterior to the lamina cribrosa
  - decreased VA ranging from near normal to hand motion with majority 20/200 range
  - dilated tortuous vessels, with numerous retinal hemes and CWS



Pacific University Ocular

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### Central Retinal Vein Occlusion

- Visual morbidity and blindness are primarily from:
  - persistent macular edema,
  - macular ischemia and
  - neovascular glaucoma

Pacific University Ocular

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### Central Retinal Vein Occlusion

- CRVO's can be ischemic or non.
  - Classical definition of ischemic is 10-disc area of non-perfusion found on angiography
  - RAPD and ERG maybe better predictor
  - VA's typically worse in ischemic
  - Increased number of cotton wool spots with decreased VA maybe predictive

Pacific University Ocular

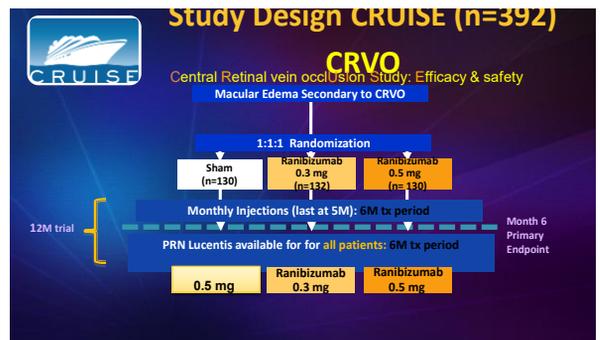
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### Central Retinal Vein Occlusion

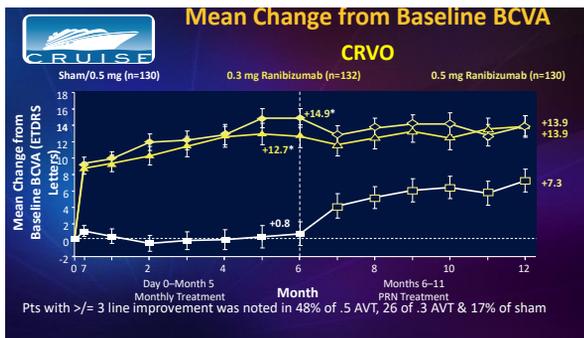
- Ischemic CRVO may lead to iris neovascularization and neovascular glaucoma
  - Estimated aprx 20% of CRVO's are ischemic with 45% of those developing neo
- Regular examinations (1-2 wks) to monitor for ischemia or neo development
  - should include gonio as angle neo can precede iris rubeosis

Pacific University Ocular

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## Vision Loss Without Pain: Artery Occlusion

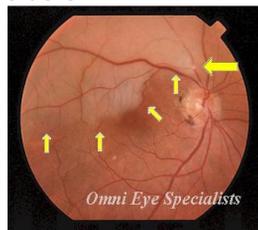
- Primarily embolic in nature from cholesterol, calcifications, plaques.
- Usually occurs in elderly associated with:
  - hypertension (67%),
  - carotid occlusive disease (25%),
  - DM (33%) and
  - cardiac valvular disease.
- Sudden loss of unilateral, painless vision
  - defect dependent upon location of occlusion



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## Vision Loss Without Pain: Artery Occlusion

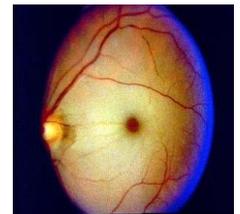
- BRAO typically located in temporal retinal bifurcations.



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## CRAO

- CRAO has profound vision loss with history of amaurosis fugax.
  - Vision is usually CF (count fingers) to LP (light perception) with positive APD.
  - Diffuse retinal whitening with arteriole constriction, cherry red macula.



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## Ophthalmic Emergency

- Treatment is controversial due to poor prognosis and questionable benefit.
- Treat immediately before workup, if patient presents within 24 hours of visual loss:
  - Digital ocular massage,
  - systemic acetazolamide (500 mg IV or po),
  - topical ocular hypertensive drops (Iopidine, B-blocker),
  - anterior chamber paracentesis,
  - consider admission to hospital for carbogen Tx (high carbon dioxide)



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Stroke Risk Before and After Central Retinal Artery Occlusion in a US Cohort  
Kevin D. Chodnicki, MD Jose S. Pulido, MD, MS David O. Hodge, MS James P. Klaas, MD John J. Chen, MD, PhD  
Mayo Proceedings VOLUME 94, ISSUE 2, P236-241, FEBRUARY 01, 2019

- To determine the risk of ischemic stroke, transient ischemic attack (TIA), and amaurosis fugax around the time of central retinal artery occlusion (CRAO).
- Overall, 5.3% had symptomatic ischemic stroke around the time of CRAO, with 2.3% occurring 15 days before CRAO, 1.3% occurring simultaneously with CRAO, and 1.7% occurring after CRAO.
  - Transient ischemic attack and amaurosis fugax were seen in 1.7% and 8.7% patients, respectively.
  - It was found that 7% of patients with embolic CRAO had a stroke around the time of CRAO as compared with 1.3% of patients with an unknown cause of CRAO.
- **Symptomatic stroke, TIA, or amaurosis fugax is common around the time of CRAO. Therefore, CRAOs require urgent embolic work-ups.**



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## Ophthalmic Emergency

- Treatment is controversial due to poor prognosis and questionable benefit.
- 30% of patients with acute CRAO and 25% of patients with acute BRAO presented an acute cerebral ischemia on MRI.
  - Such high rates support a care pathway of prompt referral of such patients for neurological evaluation and brain imaging.

Fallico M, Lotery AJ, Longo A, Avitabile T, Bonfiglio V, Russo A, Murabito P, Palmucci S, Pulvirenti A, Reibaldi M. Risk of acute stroke in patients with retinal artery occlusion: a systematic review and meta-analysis. Eye (Lond). 2020 Apr;34(4):683-689. doi: 10.1038/s41433-019-0575-y. Epub 2019 Sep 16.



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## QUICKIE

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## 13 YR Female

CC: noticed that her left eye became blurry and objects were "wavy" a couple of days ago. Sudden onset and she had experienced a headache over the left eye just prior to the vision going blurry.  
 Ocular Hx: she currently wear glasses for distance  
 Medical Hx: she is currently not diagnosed with any health problems and is not taking any medications



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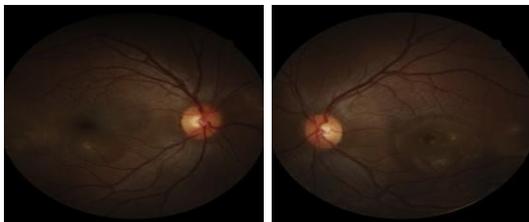
## Entrance Skills

VA with current Rx: 20/30 OD and 20/30 OS  
 Entrance skills unremarkable  
 Amsler: metamorphopsia OS  
 BCVA: 20/20 OD with increased minus, no improvement possible in the left eye  
 IOP's: 13 mm Hg OD and OS



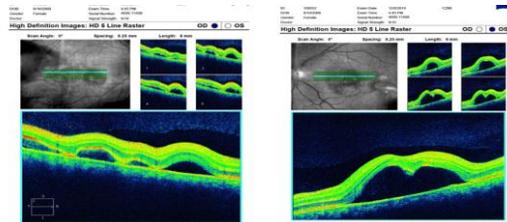
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## Fundus Photos



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## OCT



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## Retina Consult

- Referred patient to retina and they confirmed the diagnosis of VKH.
- She was begun on oral prednisone 60 mg per day and she was re-evaluated in 1 week.
- At the follow up, there was reduction in her serous retinopathy and vision was improved.



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## From the Experts

- Vogt-Koyanagi-Harada (VKH) disease is a multisystemic disorder characterized by granulomatous panuveitis with exudative retinal detachments that is often associated with neurologic and cutaneous manifestations.
- VKH disease occurs more commonly in patients with a genetic predisposition to the disease, including those from Asian, Middle Eastern, Hispanic, and Native American populations.



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## From the Experts

- VKH:
  - Patients have no prior history of ocular trauma or surgery
  - Patients have no evidence of another ocular disease based on clinical or laboratory evidence
  - Patients have bilateral ocular involvement.



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## From the Experts

- VKH:
  - The neurologic and auditory signs include the following:
    - Malaise, fever, headache, nausea, abdominal pain, stiffness of the neck and back, or a combination of these factors; headache alone is not sufficient to meet the definition of meningitis
    - Tinnitus
    - Cerebrospinal fluid pleocytosis
  - Integumentary signs include the following:
    - Alopecia: loss of body hair
    - Poliosis: loss of pigment in hair
    - Vitiligo: loss of skin pigmentation in blotchy pattern



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## VKH Treatment

- For most patients with bilateral serous detachments and severe visual loss, begin therapy with systemic prednisone (1-2 mg/kg/day).
- The length of treatment and subsequent taper must be individualized for each patient.
  - Most patients require therapy for 6 months and occasionally up to 1 year before successful tapering of systemic corticosteroids.
  - Systemic therapy should not be discontinued during the 3 months following the onset of the disease because of the risk for recurrence.



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