

Hydroxychloroquine:  
An Ophthalmic  
Update

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Financial Disclosure

- Acculens- speaker/consultant
- Eaglet- speaker/consultant

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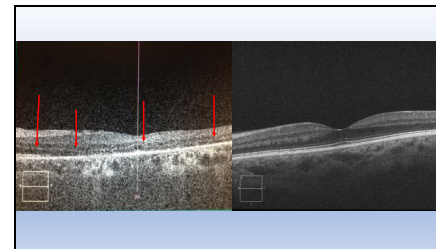
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Case 1:

- 28 year old Caucasian female
- Diagnosed years ago with severe systemic Lupus
  - Multiple organs involved
- Using hydroxychloroquine x 8 years 400mg/day
- Patient weight = 110 pounds (50kg)
- Rheumatologist added Chloroquine as well x 4 years, dose unknown
- First time patient seeing an eye doctor in years.
- Progressive vision loss past few years.

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Red flags?

1. No baseline testing
2. Dosing is considered high risk given weight
3. Duration of therapy
4. Unusual to see use of Chloroquine and Hydroxychloroquine together at high doses
5. No annual or semi-annual testing in high risk patient

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**Findings**

- BCVA
  - OD 20/150
  - OS 20/200
- Anterior segment
  - Verticillata
  - Remember CHAT
- Post Segment
  - Bullseye mac ou
  - Central field scotoma




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**Corneal Verticillata**

- Chloroquine
- Hydroxychloroquine
- Mepacrine
- Indomethacin
- Amoxifen
- Fabry's Disease

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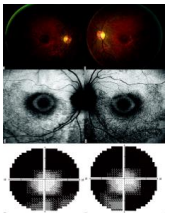
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Not my patient, but example of fields




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**Summary of Possible Signs of Toxicity**

<b>Early</b>	• Verticillata of cornea
<b>Moderate</b>	• Thinning of OUTER retina found on OCT (S/GS jet)
<b>Late</b>	• Advanced thinning/loss of Photoreceptor line on OCT

- Central vision affected
- Para-central field defect (except Asian descent)
- Visible pigmentary change around macula (bullseye)

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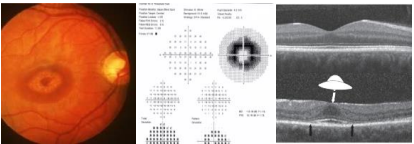
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**More examples**

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**NOT SO FAST**

So What? This is rare isn't it?

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How Many People in USA take Plaquenil 2019

- A. 400,000
- B. 1.4 Million
- C. 5 Million

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What is the Actual Incidence of Toxicity?

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5 MILLION PEOPLE

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What is the Actual Incidence of Toxicity?

- What quantifies toxicity?
  - Vision loss?
  - Repeatable field defect?
  - Visible retinal changes?
  - OCT thinning of the macula with progression?

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Hydroxychloroquine Use

- Uses:
  - malaria, Rheumatoid Arthritis, Systemic Lupus, Sjogren's disease and other autoimmune inflammatory conditions
- 2018 was the 13<sup>th</sup> most commonly prescribed medication
  - 5 million Rx's in the United States
  - Its cheap... avg per patient cost was < \$25/month
- (for comparison, Prednisone was 13<sup>th</sup>, timolol was 14<sup>th</sup>, methotrexate was 15<sup>th</sup>)

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Risk Guidelines

- 2002 guidelines for high risk:
  - >5 years cumulative dose of 1000g, >6.5mg/kg of ideal body weight, age, liver/kidney disease, other retinal disease,
  - No retesting guidelines.
- 2011 guidelines included more testing suggestions
  - 10-2 central fields, fundus photography/fundus Autofluorescence, dilated exams
  - Other tests: multifocal ERG, color testing, amder grid

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### 2016 Guidelines/Findings (most recent)

- Bullseye maculopathy is LATE stage finding.**
- Asians don't follow typical paracentral pattern. Screen with 24-2 fields, instead of 10-2
- Dosing from rheumatology now done by actual, not ideal body weight
- >5mg/kg/day = higher risk. Ex: 200lb man = 90 kg 90x5 = 450

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### What is the OUTER RETINA?

- May be defined slightly differently in different OCTs
- Typically External limiting membrane to the RPE
  - This includes the PIL line that is crucial in toxic maculopathy
  - This is what we need to follow!!!!

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### 2016 Guidelines/Findings (most recent)

**Duration/cumulative dose is still biggest risk factor**

- After 20 years of use, toxicity is found in 1 in 5 people!!!!!!!
- Liver/kidney disease or existing retinal disease increases risk
- Tamoxifen use (remember CHAI T) increases risk
- 3-6 month half life theory went out the window...

**2016 guidelines for testing/screening**

- Baseline 10-2 field (24-2 in Asians) and OCT macula + dilated exam
- Annual testing not required in LOW risk patients until 5 years on medication
- Visible fundus findings are LATE stage and are not considered vital to the screenings.

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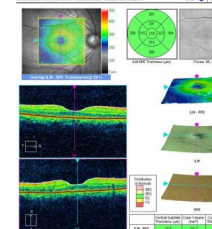
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### Stuff to Remember



- Average CENTRAL macular thickness is 250um
  - parafovea is thicker
- Toxic maculopathy affects OUTSIDE foveal center first
- Toxic maculopathy = ATROPHY of OUTER retina
  - Pay attention to "other stuff" that may affect thickness
    - ERM, VMT, ARMID etc
    - Separate outer retina

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### What should you do now?

- Be preventative, not reactive
- Look at medication list for your patient
- At minimum:
  - Baseline OCT macula, central 10-2 field (24-2 for Asians)
  - dose and duration.
  - High risk vs low risk (elderly, liver/kidney disease, weight, dose, other retinal disease)
  - progression analysis of OUTER RETINA ONLY of macula OCT
  - Low risk = yearly OCT mac and fields after 5 years, 2x yearly after 10
  - High risk = yearly or 2x yearly after 5 years.

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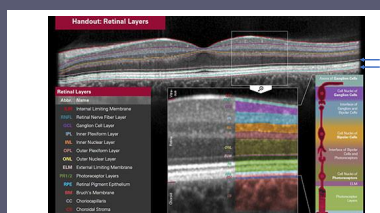
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### Handout: Retinal Layers




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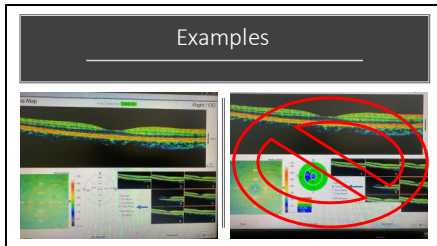
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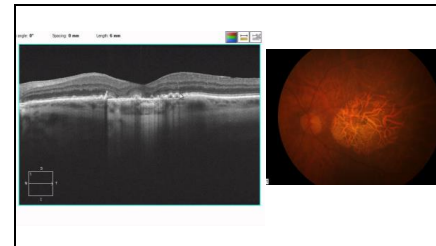
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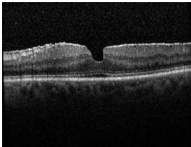
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**Toxic or Not Toxic**

- 100kg male. Taking 400mg/day x 15 years
- No other pertinent medical history



- Will this OCT show central thinning
  - YES
- TOTAL central macular thickness
  - THIN
- Inner Retinal Thickness
  - Centrally THIN
  - Parafovea actually would look thicker due to ERM
- Outer Retinal Thickness
  - NORMAL

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**Toxic or Not Toxic**

- 37 year old female
- Medical history: hx of alcohol/substance use, liver function...probably not good
- Medication history: unknown
- Occupation
  - Singer/entertainer; questionable decision maker




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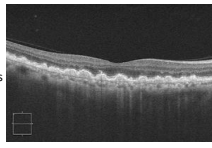
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**Toxic or Not Toxic**

- 50kg female. 200mg/day
- 74 years old, 10 years on plaquenil
- Smoker
- No other pertinent hx or meds
- Risks?
  - Age, Duration




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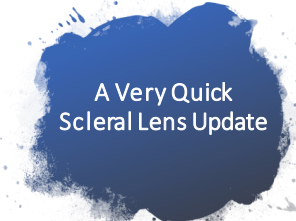
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A Very Quick Scleral Lens Update




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### Review of Uses

- Keratoconus/Pellucid
- Salzmann's
- High Ammetropia
- Post-surgical Irregular astigmatism
- Corneal opacities
- Exposure keratitis
- Dry Eye
- Presbyopia

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### Center Near Progressive




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### Dual Aspheric Design

- Available in scleral and corneal designs
- Works exceptionally well for emerging presbyopia up to 50 years old
- Push PULLS - DO NOT OVER MINUS PATIENT
- Consider a subtle modified mono-vision for patients 55-55 years old (+ .50 more in the non-dominant eye)
- Able to obtain binocular vision
- Better for lower adds
- Helpful in dominant eye with a different design in non-dominant eye
- Up to +2.00




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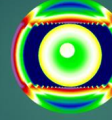
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### Periscope Multifocal



- Decentered optics
- Ideal if lens sitting low or decentered pupil
- Center Near optics
- Newly available as front toric!!!!!!

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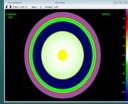
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### Center Near Lenses

- Proper lens centration is very important (scleral lens ideal)
- Indicated for higher add needs (patients 50 years and older)
- Any ADD power available
- Pupil size dependent (normal illumination)
- Can create a slight shadowing in near prints
- A slight compromise in distance acuity can occur in bright sunlight
- Can be utilized with a dual aspheric design to improve intermediate and distance vision
- Dominant eye - Dual Aspheric / Non-Dominant eye - Center add




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### New Technology

- SCLERAL topographers- **measure out to 20mm**
  - **Eaglet - Eye Surface Profiler**
    - Fluorescence based profilometry
    - Based on elevation maps
    - Non company specific -> works with many designs
  - **Visionary Optics - S-map 3D**
    - Fluorescence based imaging
    - Europe scleral lens
  - **Pentacam**
    - Now capable of measuring sagittal height
    - Scheinflug image not requiring fluorescein

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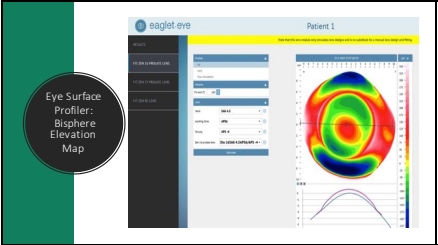
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