

PLAQUENIL AND THE EYES

DR. BRIDGET C. GRUBB, O.D.

L.O. EYE CARE

PLAQUENIL BASICS

PLAQUENIL BASICS¹

- PLAQUENIL
- HYDROXYCHLOROQUINE SULFATE

- FIRST APPROVED IN THE U.S. IN 1955
- AVAILABLE IN 100-400 MG SIZED TABLETS
- CONSIDERED “ANTIMALARIAL” AND “ANTIRHEUMATOLOGICAL”
 - DISEASE-MODIFYING ANTIRHEUMATIC DRUG (DMARD)

MEDICATION USES¹

- UNCOMPLICATED MALARIA
- PROPHYLAXIS AGAINST MALARIA
- ACUTE AND CHRONIC RHEUMATOID ARTHRITIS



SYSTEMIC LUPUS ERYTHEMATOSUS

CHRONIC DISCOID LUPUS ERYTHEMATOSUS

MEDICATION USES³

- IN ADDITION TO ANTIMALARIAL AND ANTIRHEUMATOLOGICAL (DMARD) QUALITIES, PLAQUENIL IS CONSIDERED:
 - ANTICANCER
 - ANTIDIABETIC
 - ANTIMICROBIAL
 - ANTIFUNGAL
 - ANTI-HIV
 - ANTIOXIDANT

MEDICATION USES⁴

- COVID-19
 - DIRECT ANTIVIRAL ACTIVITY
 - INDIRECT ANTI-INFLAMMATORY ACTIVITY

MEDICATION PRESCRIBERS

- PCP
- RHEUMATOLOGIST
- YOUR DOCTOR SHOULD PROVIDE COUNSELING TO DETERMINE RISKS, BENEFITS, AND ALTERNATIVES!

SERIOUS SIDE EFFECTS¹

- HEART: CARDIOMYOPATHY, VENTRICULAR ARRHYTHMIA
- KIDNEY: RENAL TOXICITY
- SKIN: STEVENS JOHNSON SYNDROME, TOXIC EPIDERMAL NECROLYSIS, WORSENING OF PSORIASIS, AND MANY OTHERS
- BLOOD: HEMATOLOGIC TOXICITY
- MUSCULOSKELETAL: SKELETAL MUSCLE MYOPATHY, NEUROPATHY
- NEUROPSYCHIATRIC: NEW ONSET OR WORSENING DEPRESSION, SUICIDAL THOUGHTS OR ACTIONS

MOST COMMON SIDE EFFECTS¹

- GASTROINTESTINAL (GI):
 - NAUSEA
 - VOMITING
 - DIARRHEA
 - ABDOMINAL PAIN

TYPICAL DOSES¹

- RA
 - LOADING DOSE: 400-600 MG
 - CHRONIC DOSE: 200-400 MG
- SLE
 - CHRONIC DOSE: 200-400 MG
- DLE
 - CHRONIC DOSE: 200-400 MG

MEDICATION STANDARD OF CARE⁵

- GENERAL: DOSE NOT TO EXCEED 400 MG PER DAY IN A HEALTHY-WEIGHTED INDIVIDUAL
- “LESS THAN 5 MG/KG OF REAL WEIGHT PER DAY”
- WEIGHT IN LBS / 2.2 = KG
- TOTAL DAILY DOSE / KG = MG/KG
- 175 LB / 2.2 = 79.55 KG
- 400 MG / 79.55 KG = 5.03, HIGHER RISK (>5 MG/KG)

MEDICATION STANDARD OF CARE⁵

- HIGH RISK:
 - UNDERWEIGHT INDIVIDUALS
 - > 5 MG/KG OF REAL WEIGHT PER DAY
 - KIDNEY DISEASE
 - TAMOXIFEN USE
 - PREEXISTING RETINOPATHY
- LESSER RISK:
 - AGE, LIVER DISEASE, GENETIC MARKERS (8)

INCIDENCE⁶

- RISK OF RETINOPATHY (WITHOUT HIGH RISK FACTORS)
 - 1% AT 0-5 YEARS
 - 2% AT 10 YEARS
 - 20% AT 20 YEARS

MECHANISM OF ACTION (MOA)²

- PLAQUENIL INCREASES CELLULAR PH WHICH DISRUPTS PROTEIN PRODUCTION, MODIFICATION, AND BREAKDOWN.
- WHEN PROTEIN FUNCTION IS DISRUPTED, THAT DIRECTLY DECREASES THE AUTO-IMMUNE RESPONSE THAT CAUSES INFLAMMATION AND DAMAGE.

MEDICATION MOA⁷

- PLAQUENIL BINDS TO PIGMENT (MELANIN) IN THE EYES!



RETINAL PIGMENT EPITHELIUM

- CILIARY BODY
- CHOROID
- IRIS

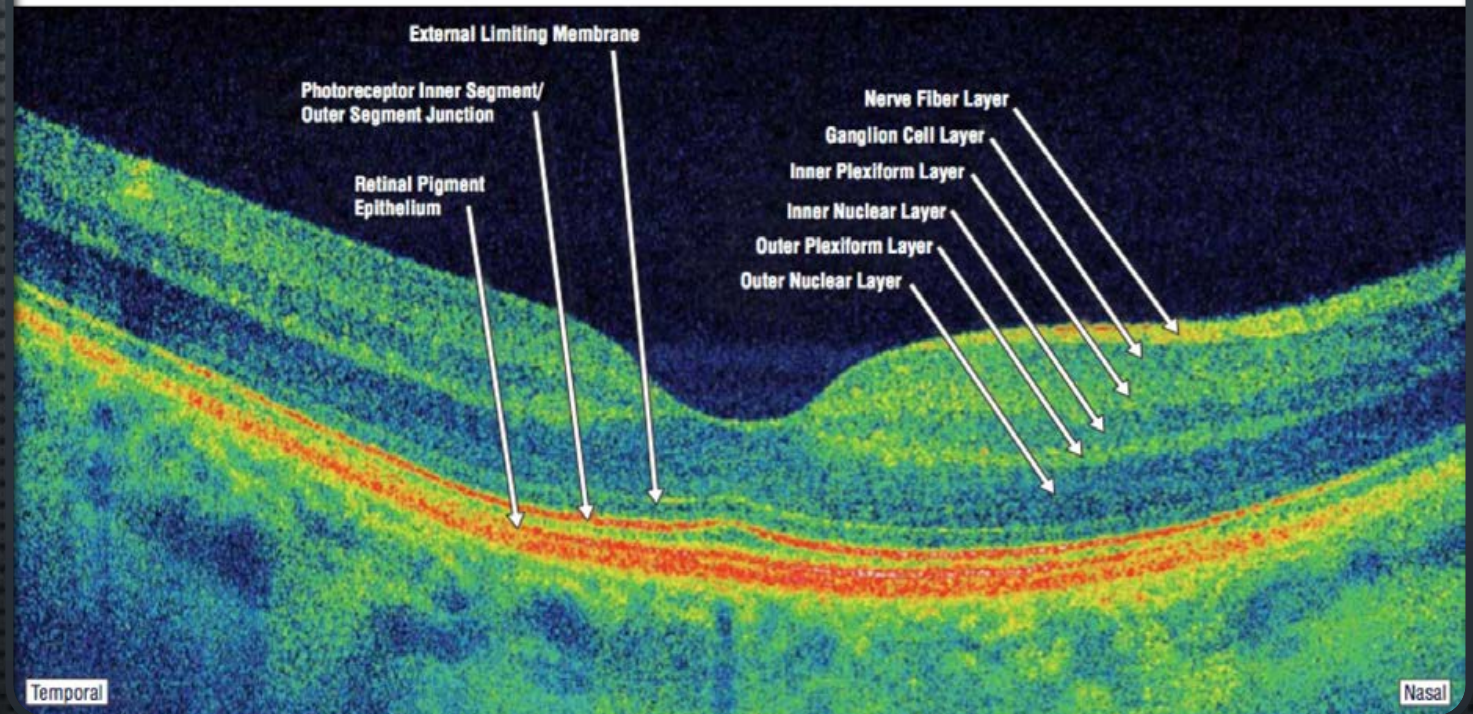
MEDICATION MOA⁷

- MELANIN'S ROLES:
 - ANTIOXIDANT
 - PROTECTS AGAINST LIGHT TOXICITY
- IF MELANIN IS BOUND BY PLAQUENIL:
 - OXIDATIVE STRESS FROM CONSTANT METABOLISM BUILDS UP AND CAN CAUSE DAMAGE AT A CELLULAR LEVEL

MEDICATION MOA⁵

- PLAQUENIL BINDS TO PIGMENT IN THE RETINA

Spectral Domain-OCT



LUPUS AND THE EYES

AREAS OF INFLAMMATION⁸

- EXTERNAL

- EYELID SWELLING
- PTOSIS
- EPISCLERITIS
- SCLERITIS
- DRY EYE
- PUK
- CONJUNCTIVITIS

- INTERNAL

- UVEITIS (ANT/POST/BEHCHET'S)
- IDIOPATHIC ORBITAL INFLAMMATORY SYNDROME
- CWS, CRAO, CRVO
- CSR
- POSTERIOR ISCHEMIC OPTIC NERUOPATHY
- MYASTHENIA GRAVIS
- SARCOID



<https://www.drsehashah.com/droopy-eyelids-ptosis.php>

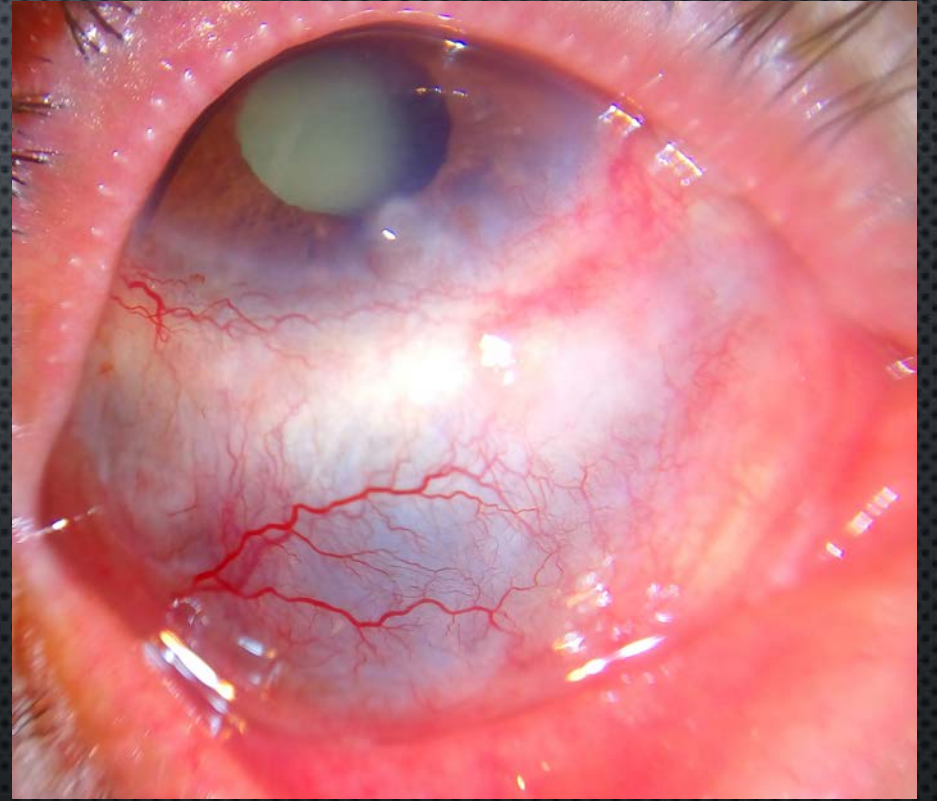


<https://www.dovepress.com/ocular-myasthenia-gravis-a-current-overview-peer-reviewed-fulltext-article-EB>

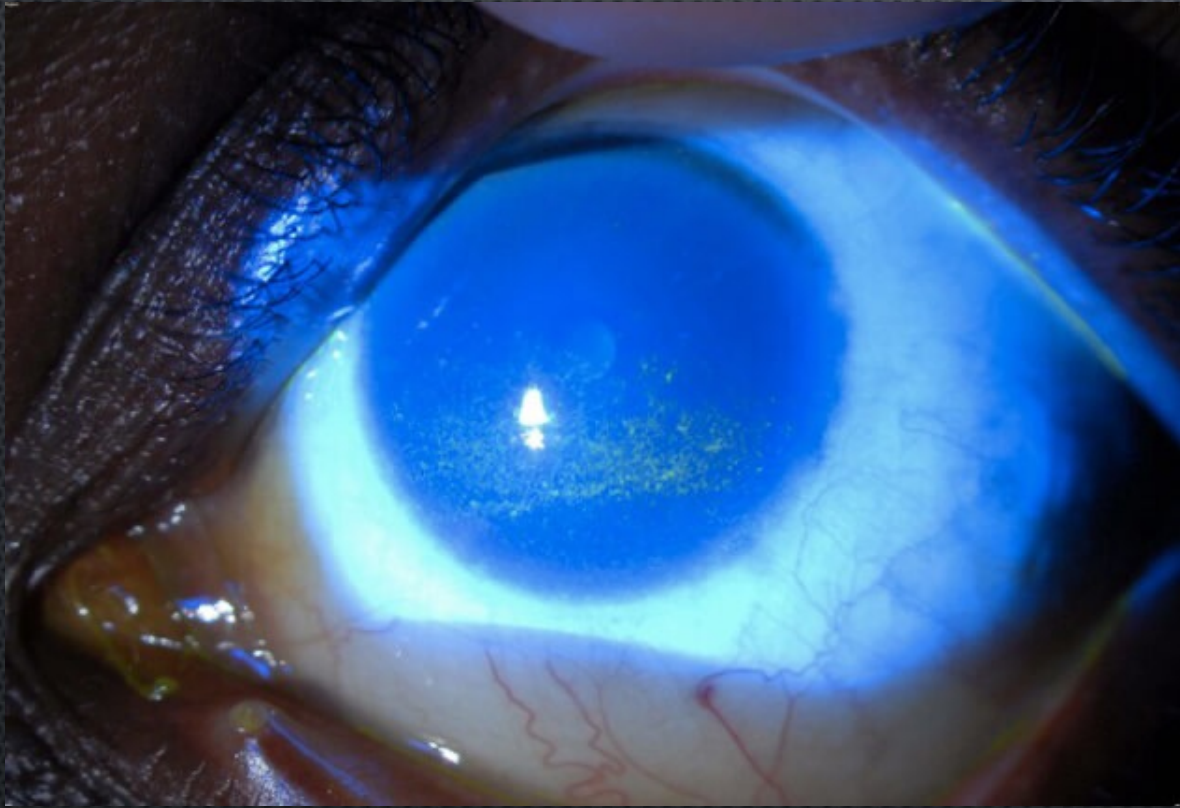
https://www.researchgate.net/figure/A-Erythematous-swelling-with-mild-scaling-and-telangiectasia-of-the-left-upper-eyelid_fig1_251636254



<https://eyewiki.aao.org/Episcleritis>



[HTTPS://EYEWIKI.AAO.ORG/SCLERITIS](https://eyewiki.aao.org/Scleritis)



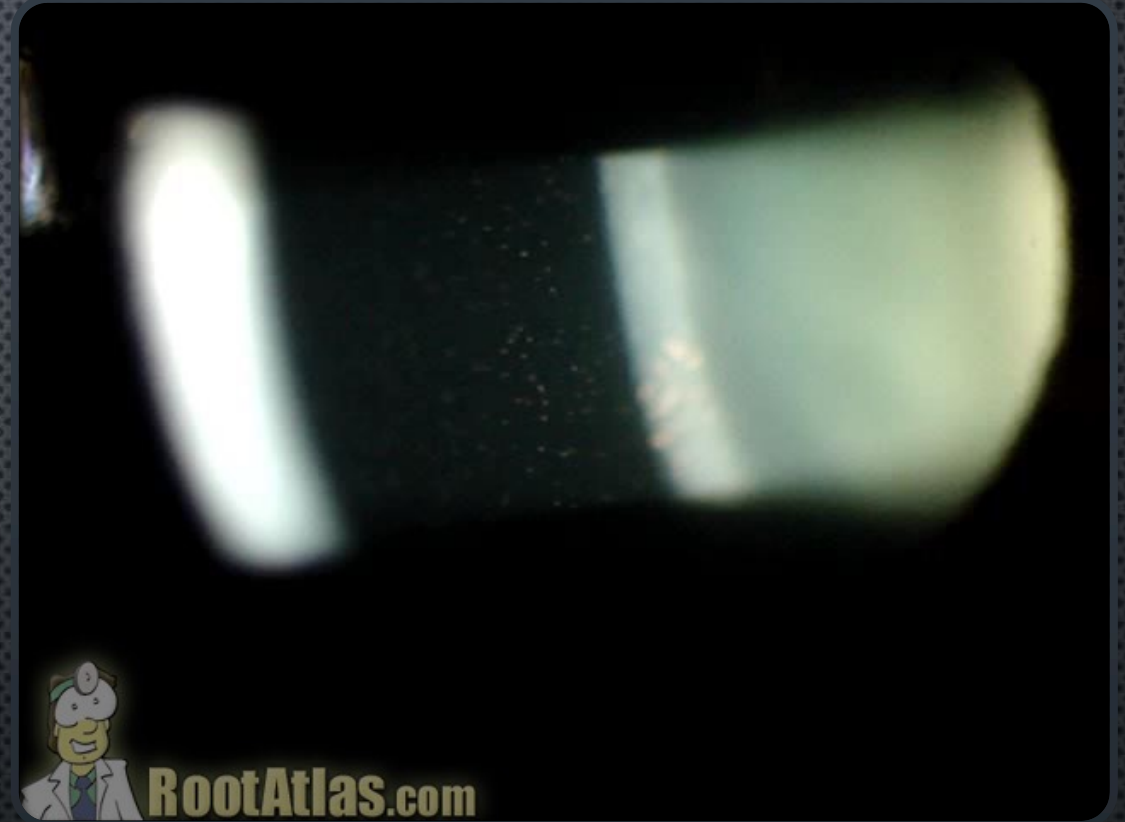
<https://www.willseye.org/ocular-surface-disease/>



<https://www.allaboutvision.com/conditions/conjunctivitis.htm>

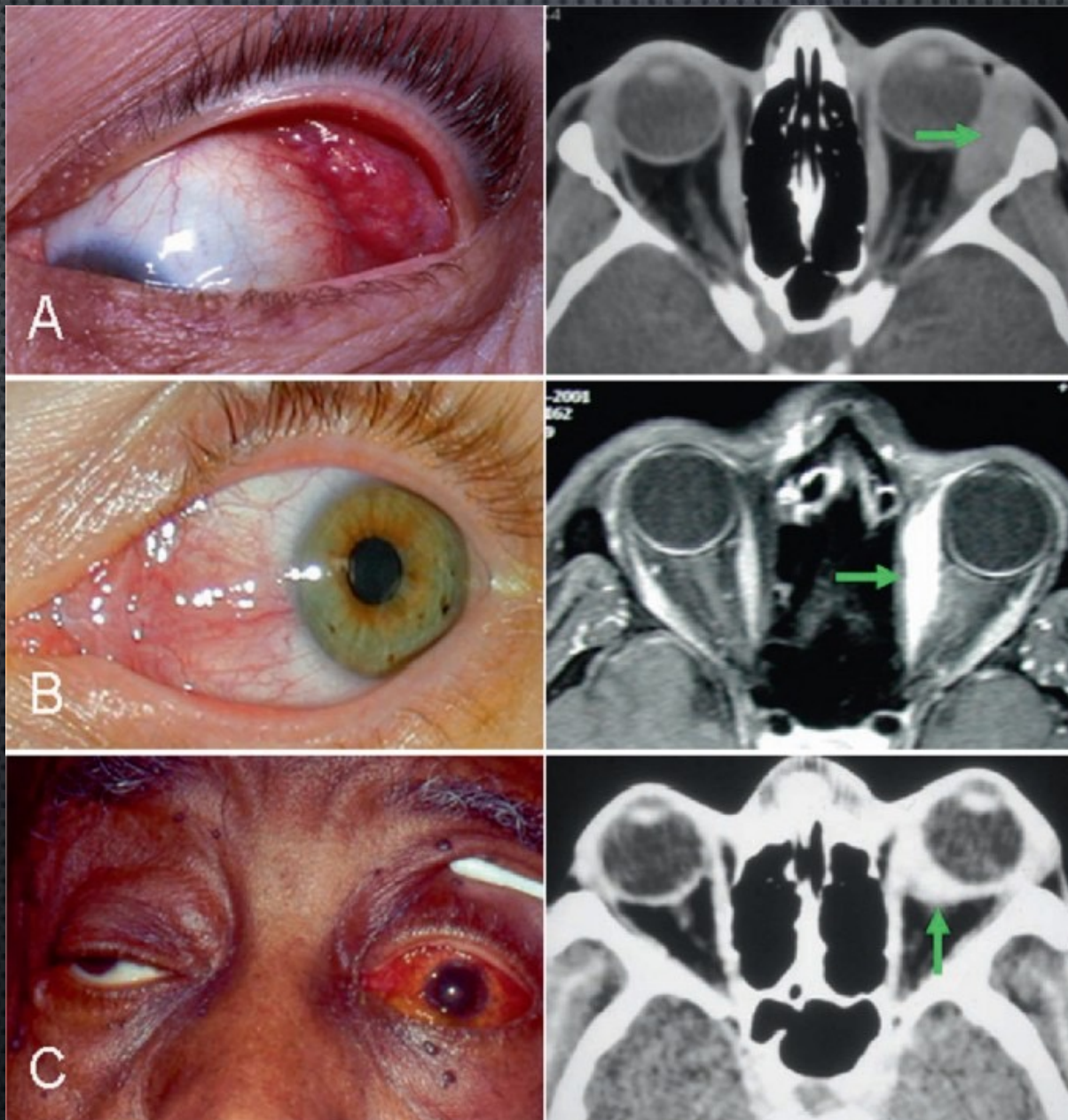


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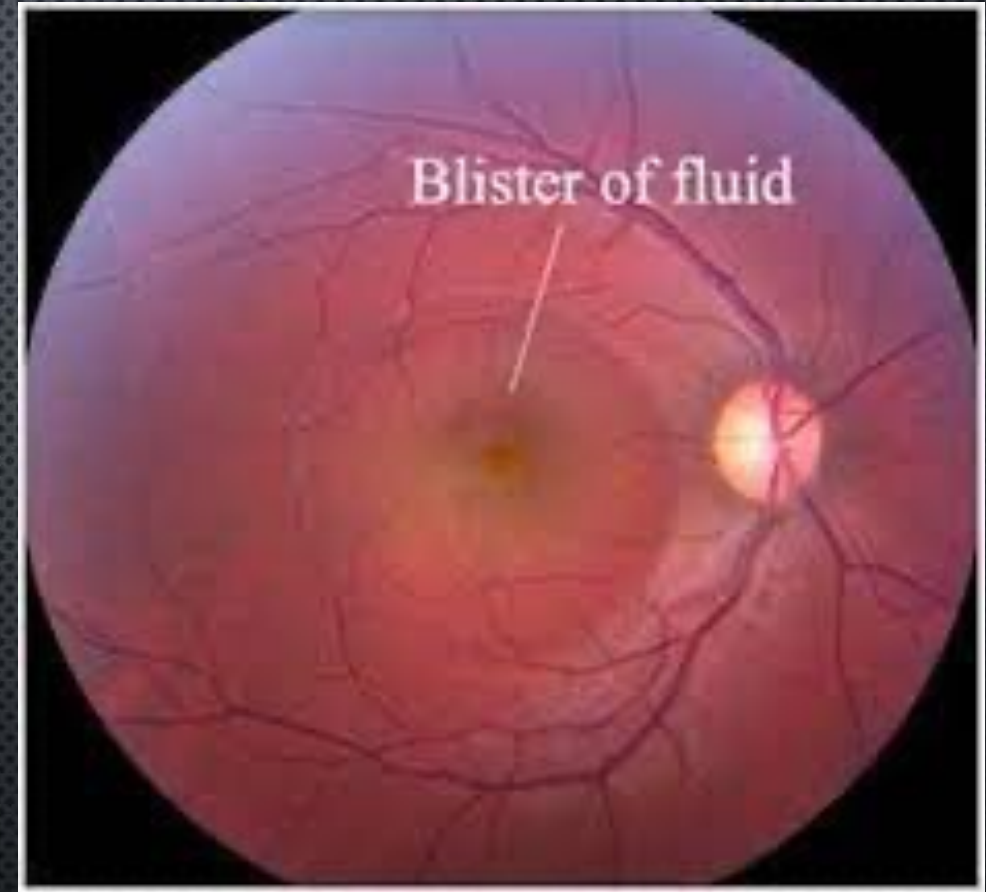
 **RootAtlas.com**

<https://timroot.com/cell-and-flare-in-the-eye-video/>





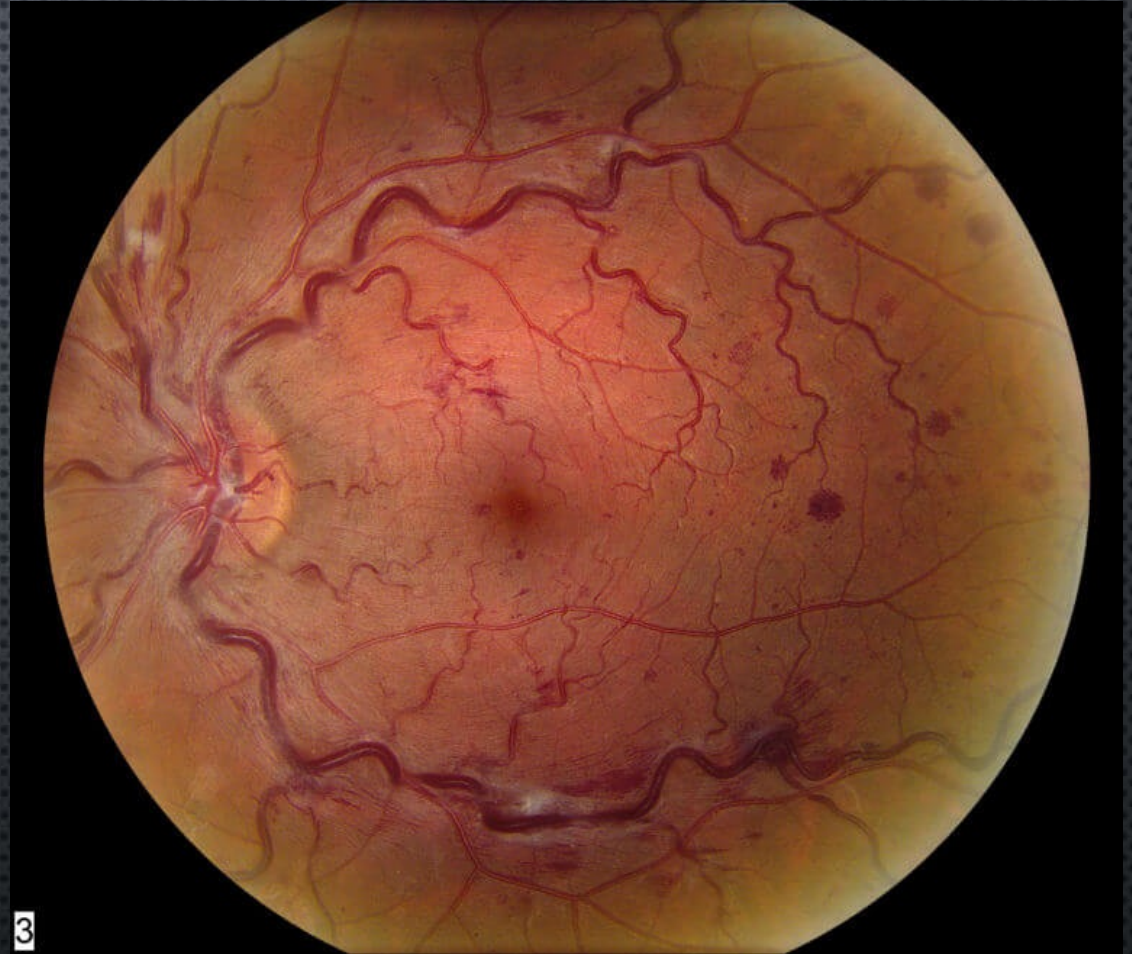
<https://www.reviewofophthalmology.com/article/cotton-wool-spots-may-challenge-diagnosis>



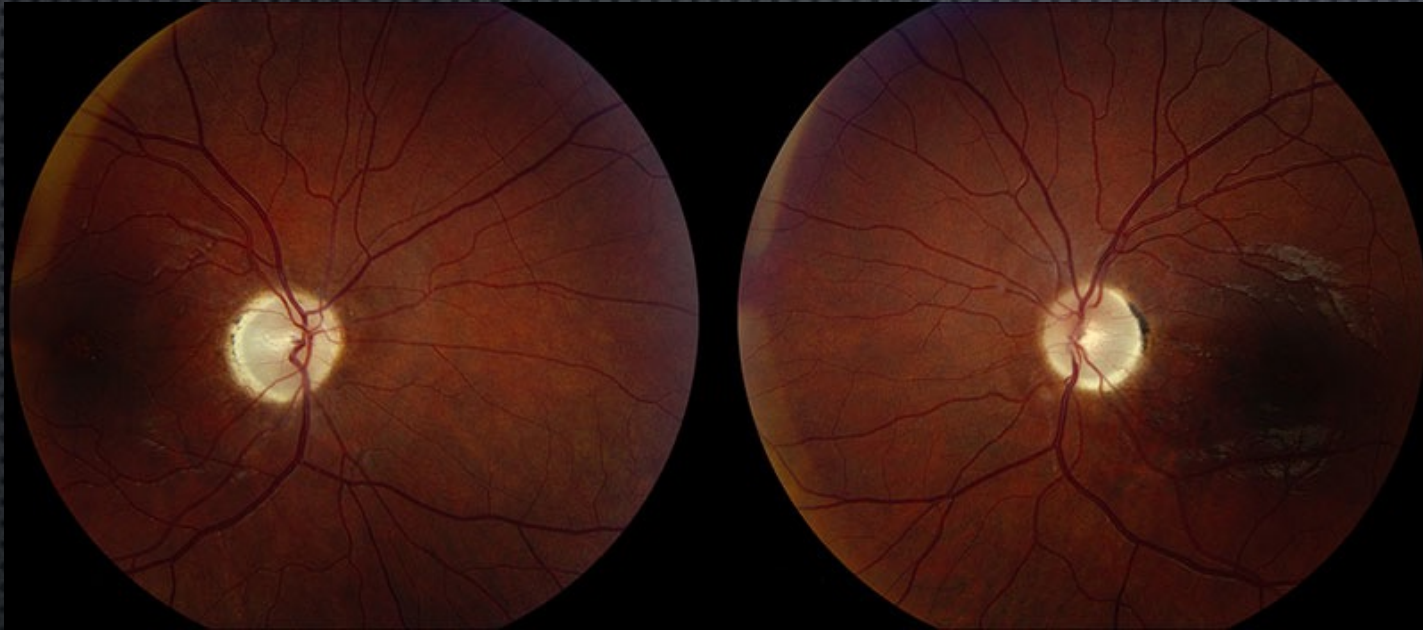
<https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.retinaeye.com%2Fcontents%2Fcommon-diseases%2Fmacular-conditions%2Fcentral-serous-chorioretinopathy&psig=AOvVaw13D-oUvrN0EAODSD9K8-HO&ust=1711893281674000&source=images&cd=vfe&opi=89978449&ved=0CBIQjRxqFwoTCKC66MmRnIUDFQAAAAAdAAAAABAE>



<https://morancore.utah.edu/basic-ophthalmology-review/central-retinal-artery-occlusion/>



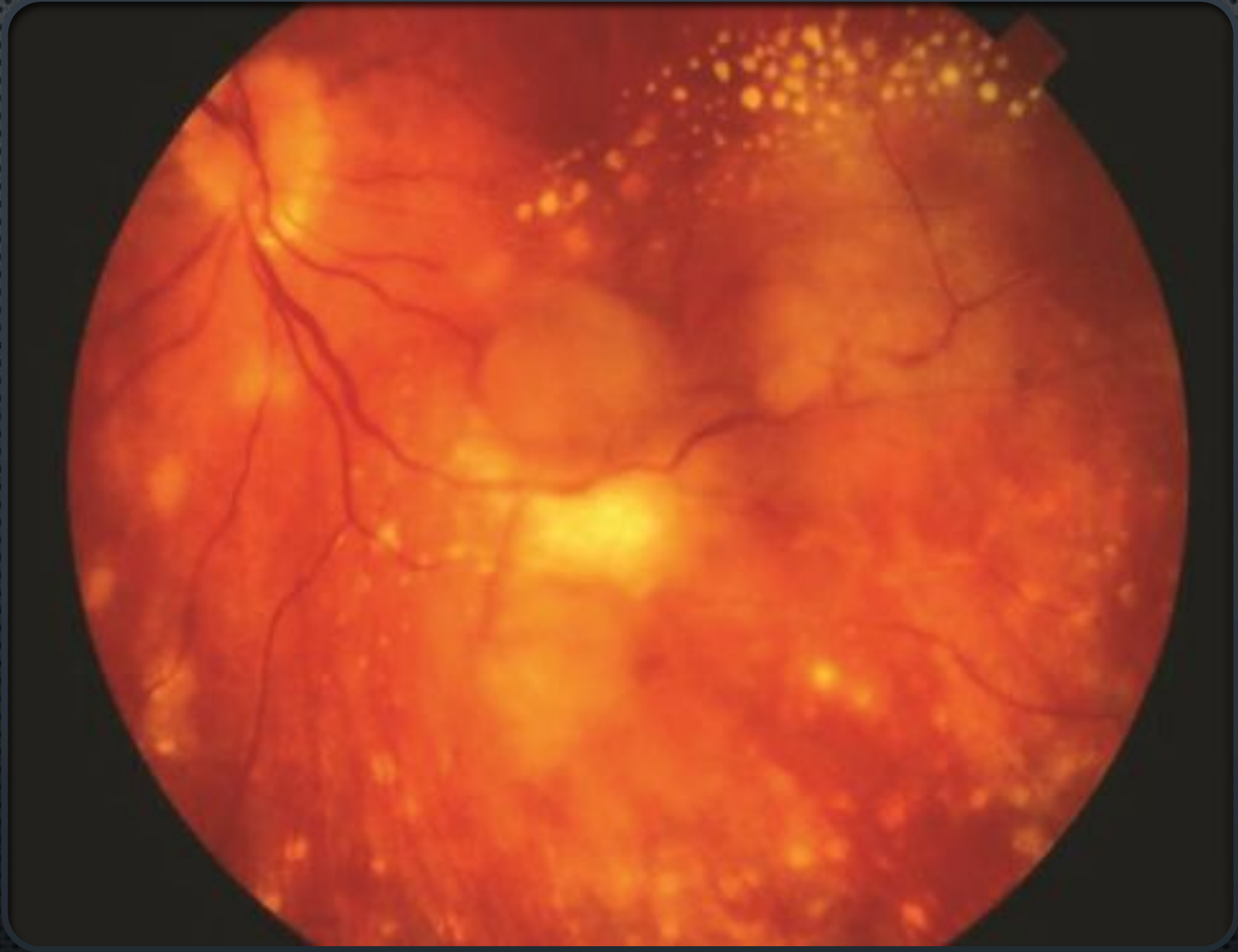
<https://www.willseye.org/central-retinal-vein-occlusion-crvo/>



<https://webeye.ophth.uiowa.edu/eyeforum/cases/212-PION.htm>



<https://www.sciencedirect.com/science/article/pii/S0181551218304145>



https://eyewiki.aao.org/File:AA0_54541.jpg

PLAQUENIL AND THE EYES PURPOSE:

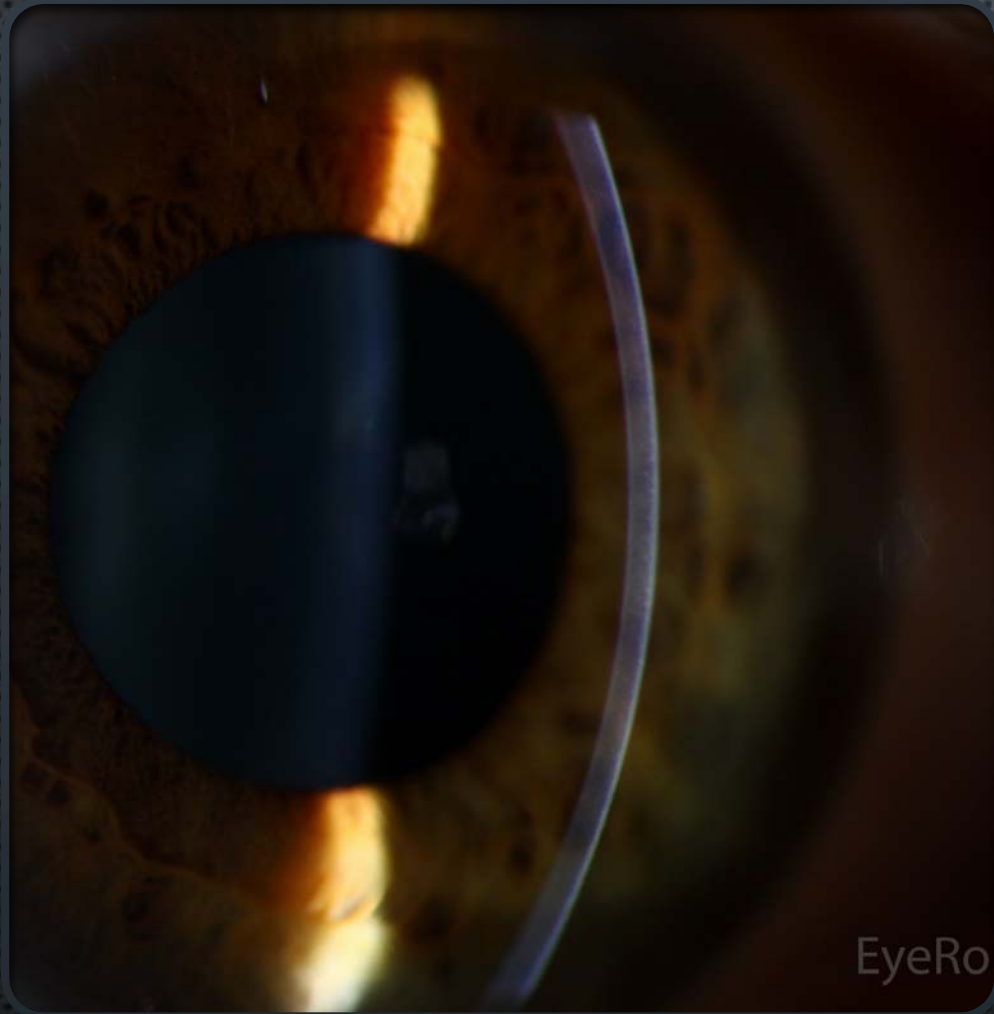
TO REDUCE INFLAMMATION!

TOXICITY – IT IS TRULY RARE! BUT...

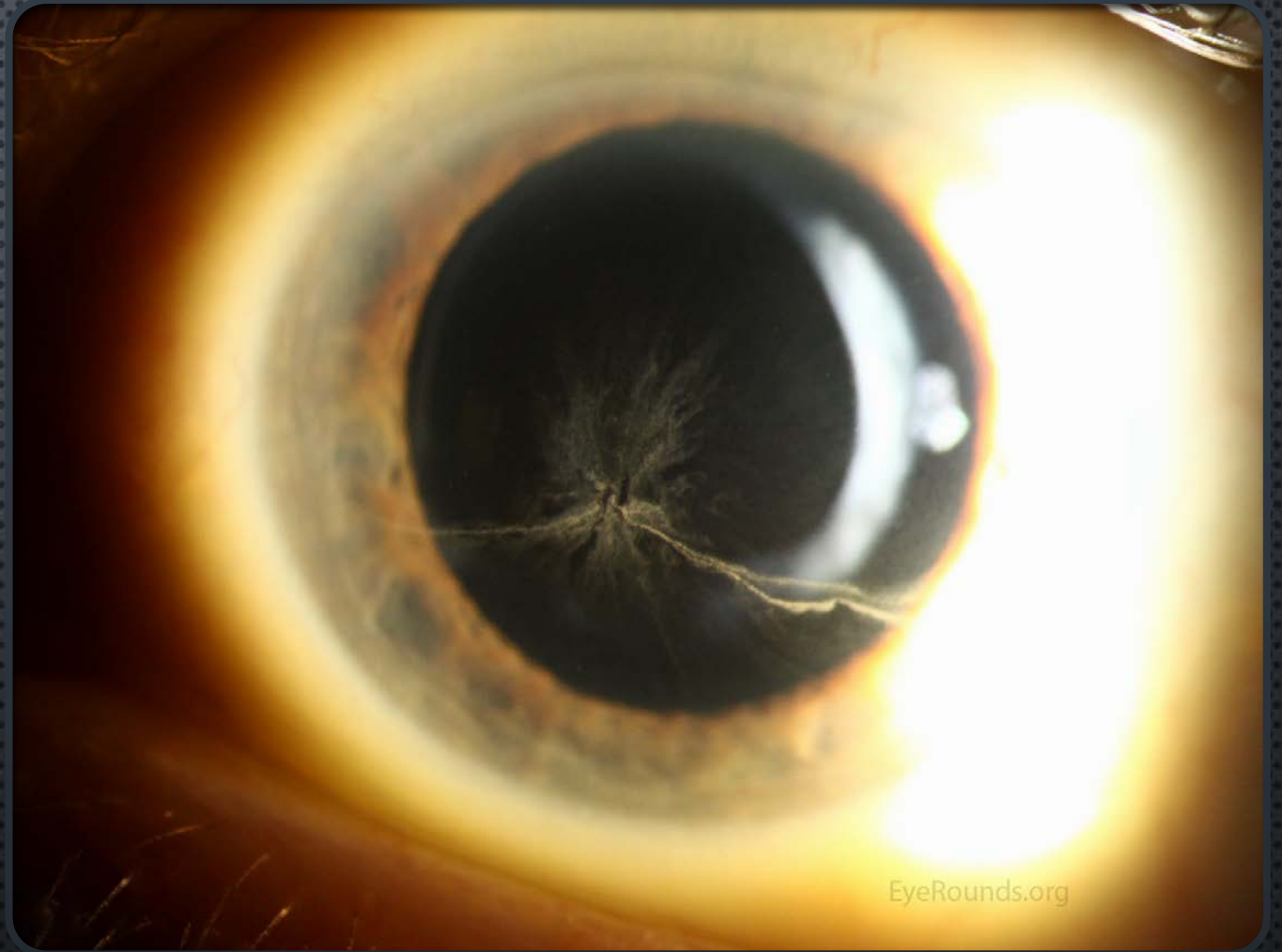
- IF TOXICITY IS PRESENT:
- WHEN POSSIBLE, MEDICATION SHOULD BE STOPPED IMMEDIATELY, AS RETINAL DAMAGE IS **PERMANENT!**
- YOUR EYE DOCTOR WILL INFORM YOU AND CONTACT YOUR PCP/RHEUMATOLOGIST TO DETERMINE NEXT STEPS
 - MEDICATION CAN LINGER IN THE BODY FOR MONTHS-YEARS AFTER STOPPING THIS MEDICATION AND CONTINUALLY CAUSE DAMAGE EVEN THOUGH YOU ARE NO LONGER TAKING IT!⁶

WARNING SIGNS OF TOXICITY

- READING DIFFICULTIES (PARACENTRAL SCOTOMA)⁵
- REDUCED COLOR VISION⁵
- CENTRAL AND PERIPHERAL VISION LOSS⁷
- NIGHT BLINDNESS (NYCTALOPIA)⁷



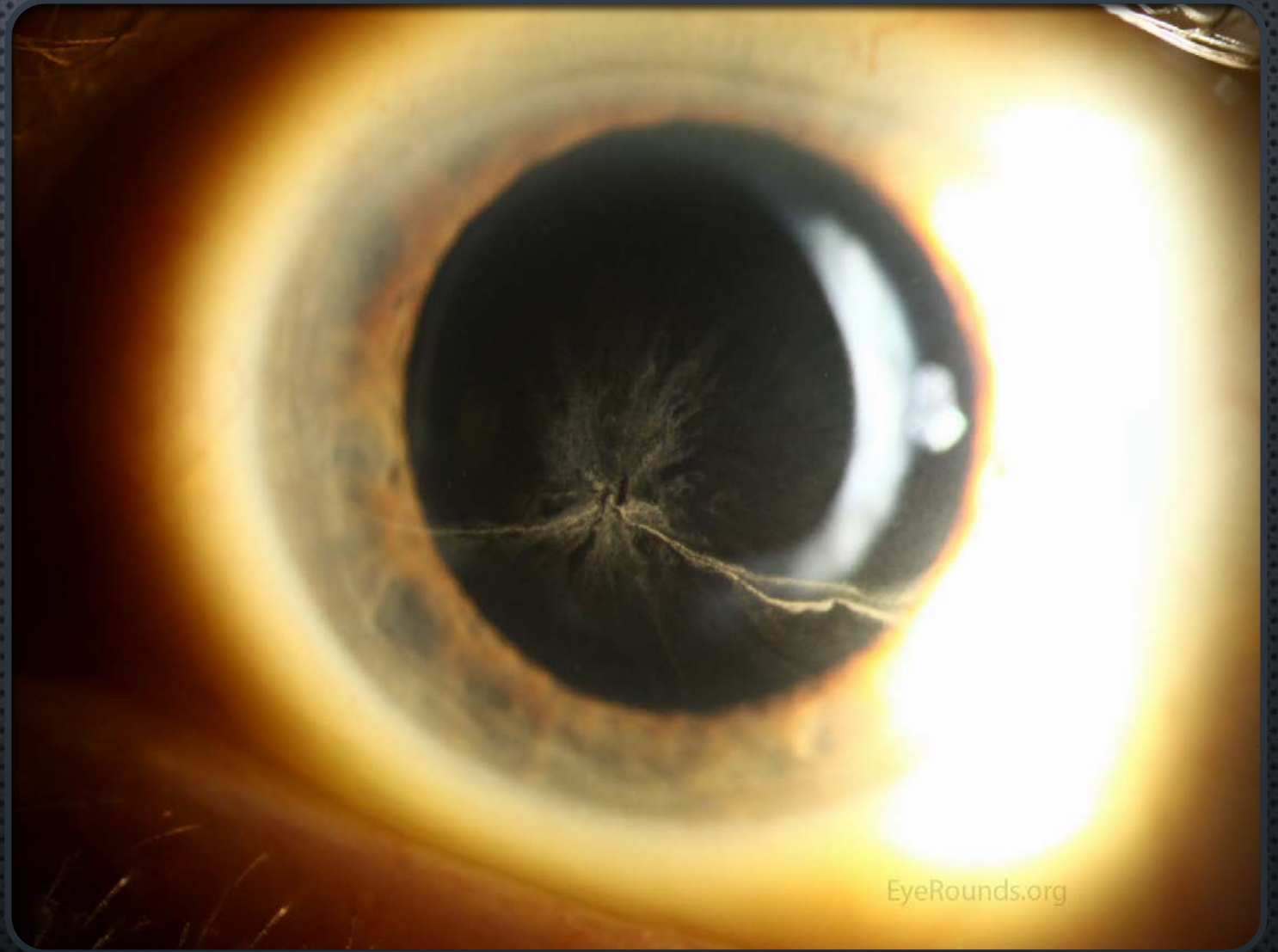
<https://webeye.ophth.uiowa.edu/eyeforum/atlas/pages/Normal-Cornea/index.htm>



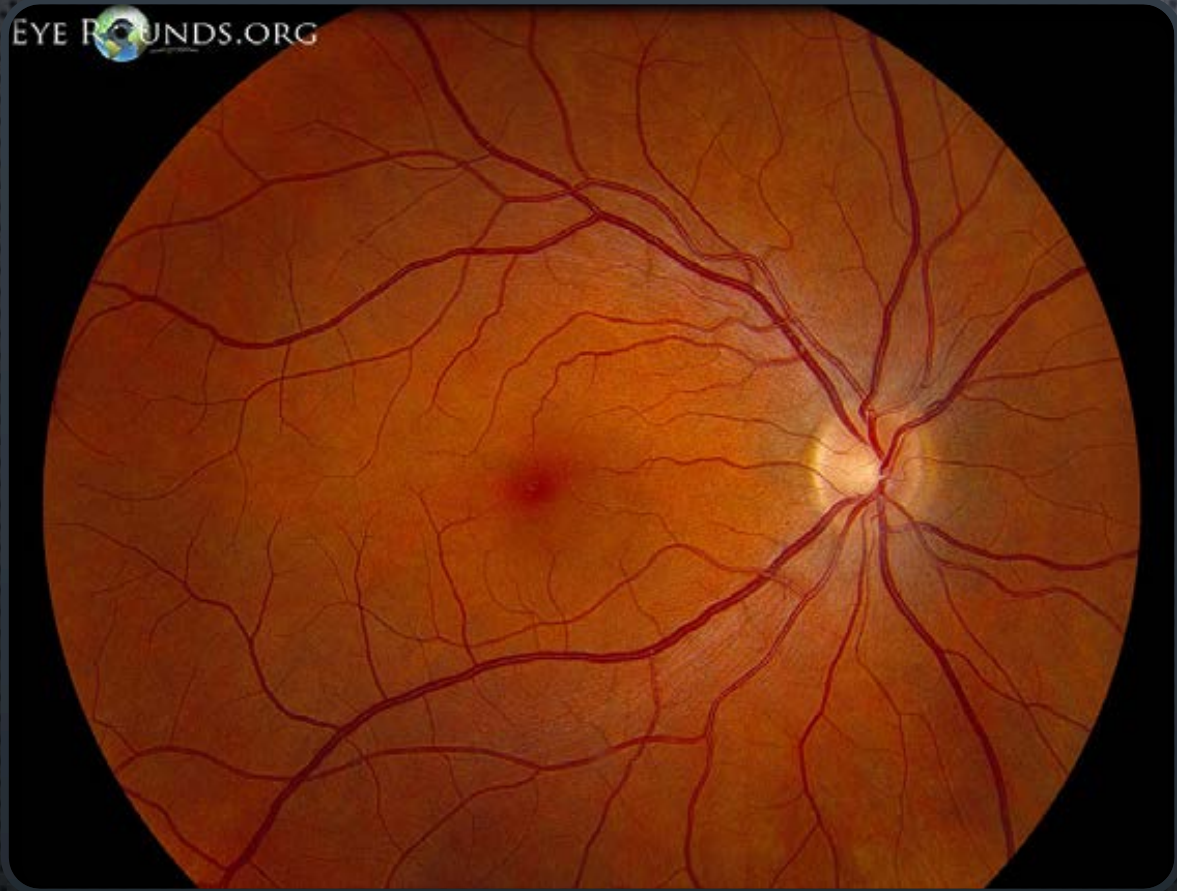
<https://webeye.ophth.uiowa.edu/eyeforum/atlas/pages/Verticillata/index.htm>

PLAQUENIL TOXICITY: CORNEAL VERTICILLATA

- CHAI-T
- RHOPRESSA
- FABRY'S DISEASE
- **NOT PERMANENT**



<https://webeye.ophth.uiowa.edu/eyeforum/atlas/pages/Verticillata/index.htm>



<https://webeye.ophth.uiowa.edu/eyeforum/atlas/pages/normal-fundus.htm>

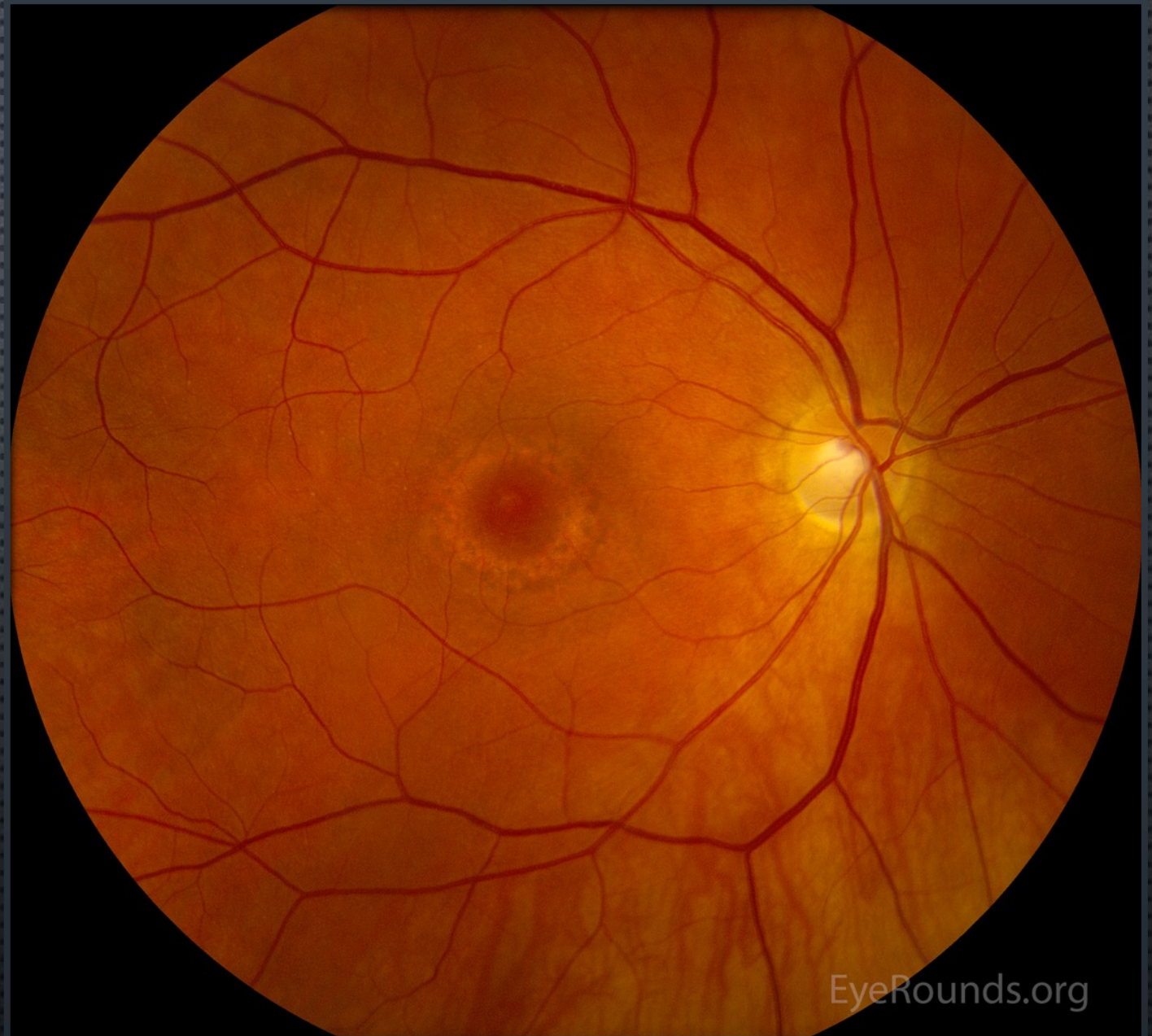


<https://webeye.ophth.uiowa.edu/eyeforum/atlas/pages/Hydroxychloroquine-toxicity/index.htm>

**PLAQUENIL
TOXICITY:**

**BULL'S EYE
MACULOPATHY**

PERMANENT



EyeRounds.org

Spectral Domain-OCT

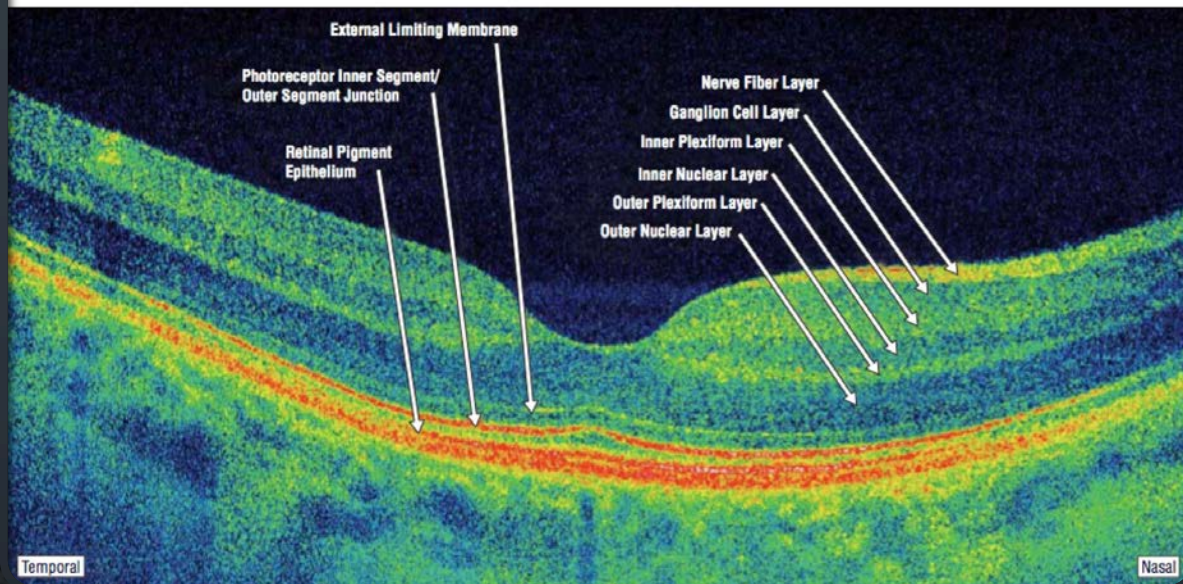


PHOTO CREDIT: REFERENCE #5

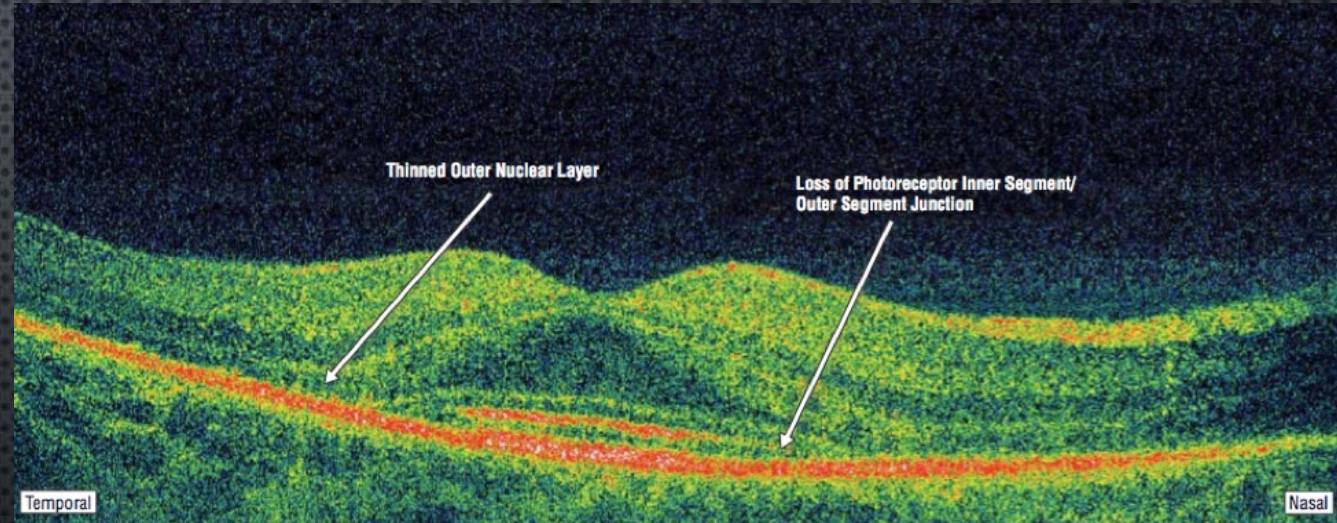
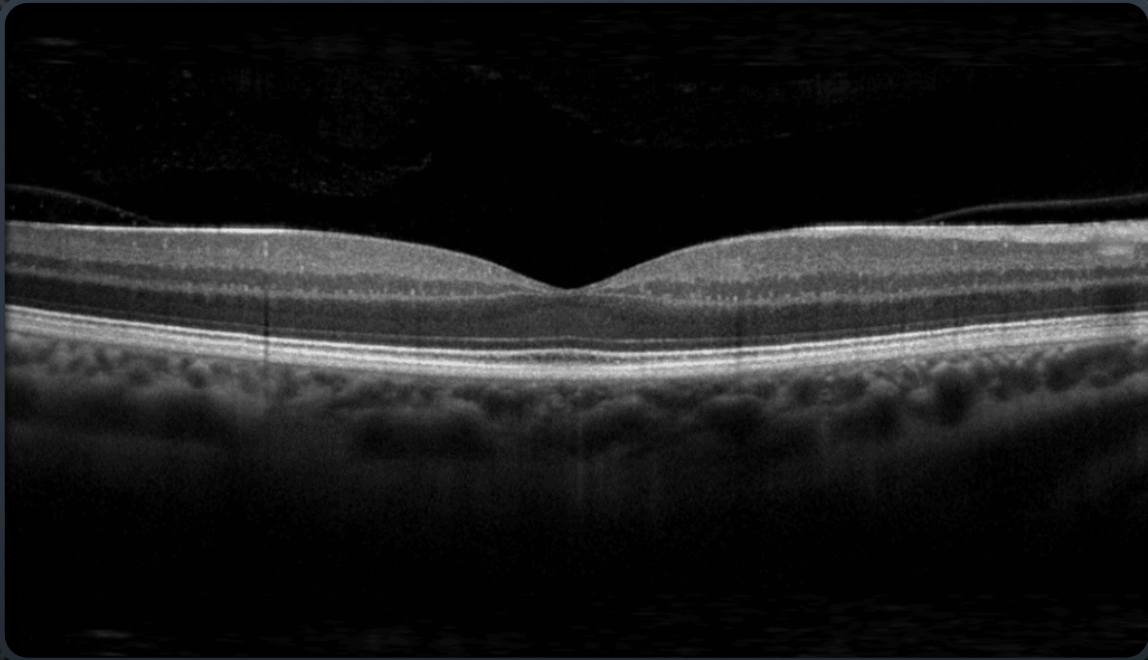


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<https://stoneycreekeyecare.com/what-is-optical-coherence-tomography-oct/>

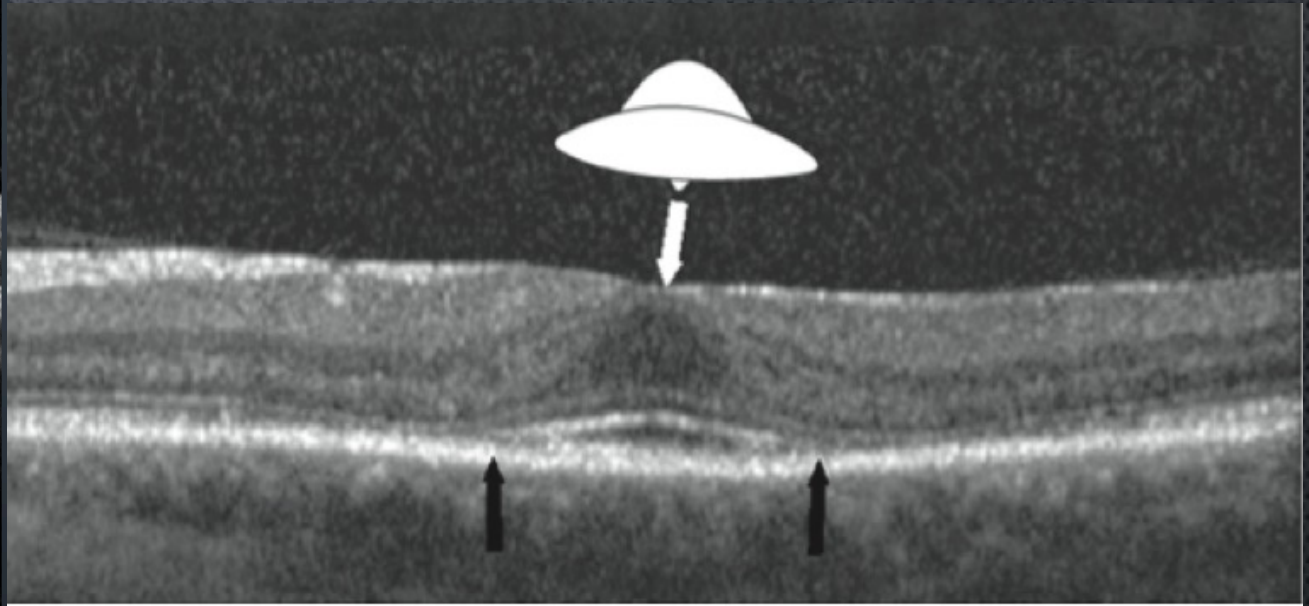


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**PLAQUENIL
TOXICITY:
FLYING SAUCER
SIGN**

PERMANENT

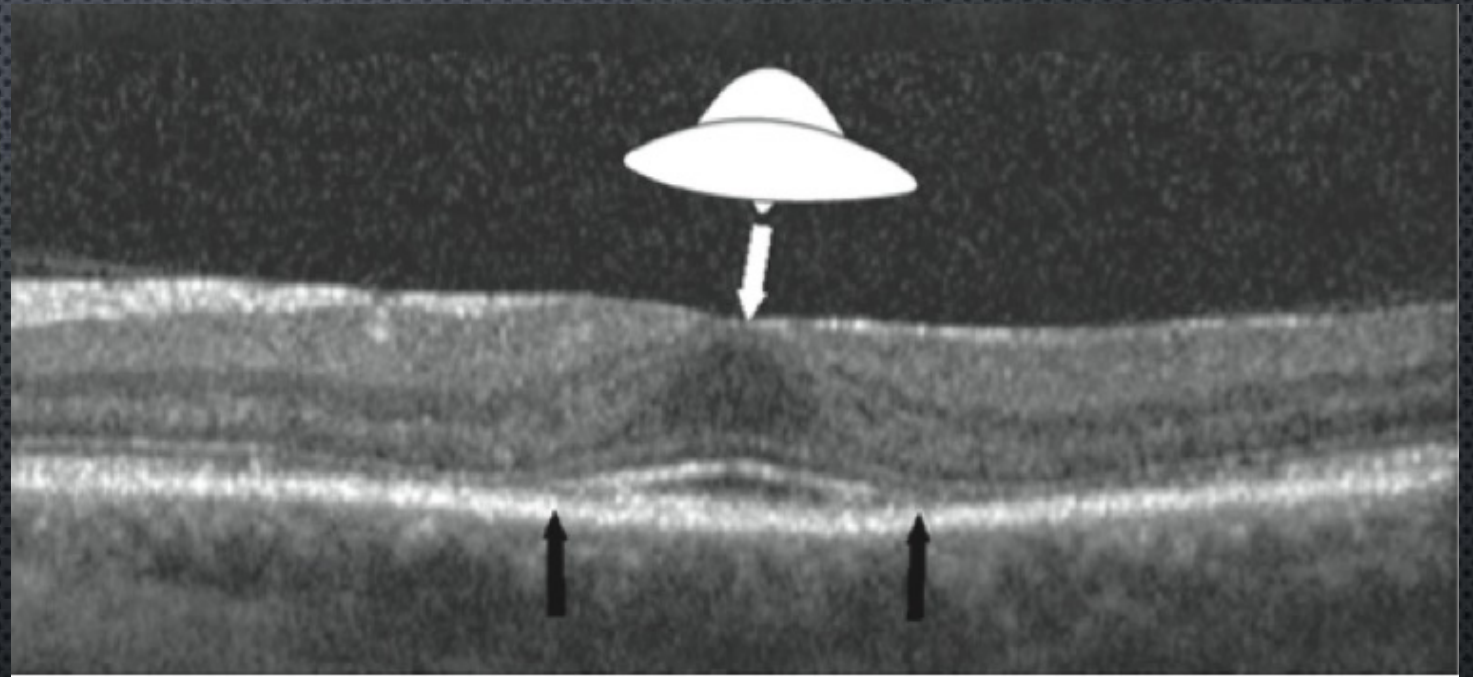
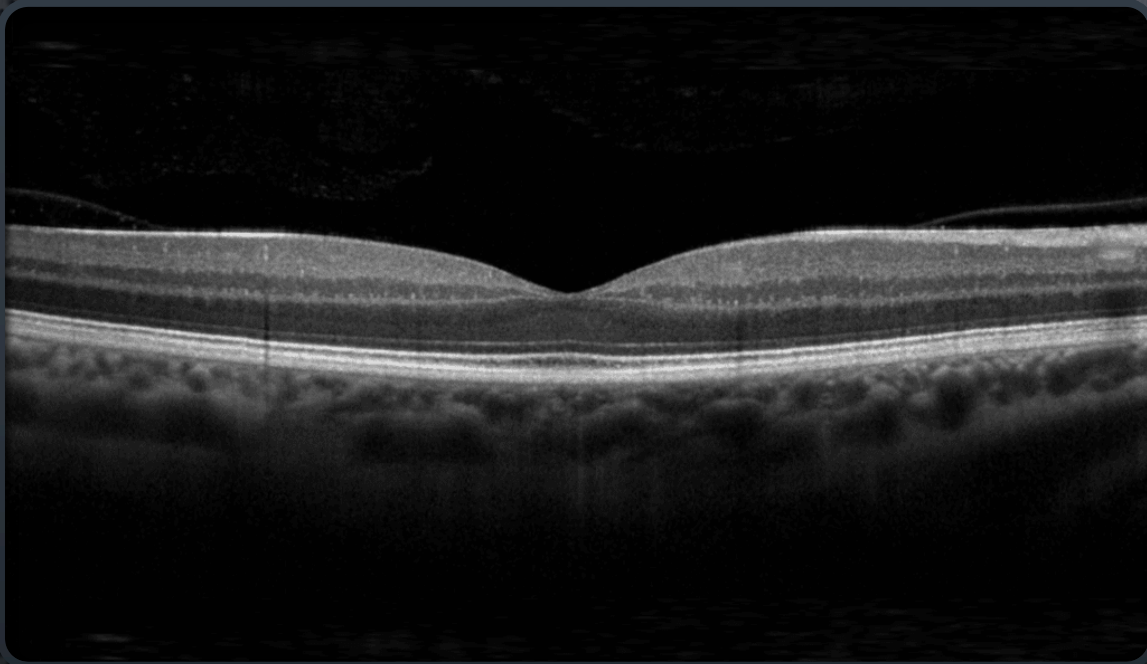
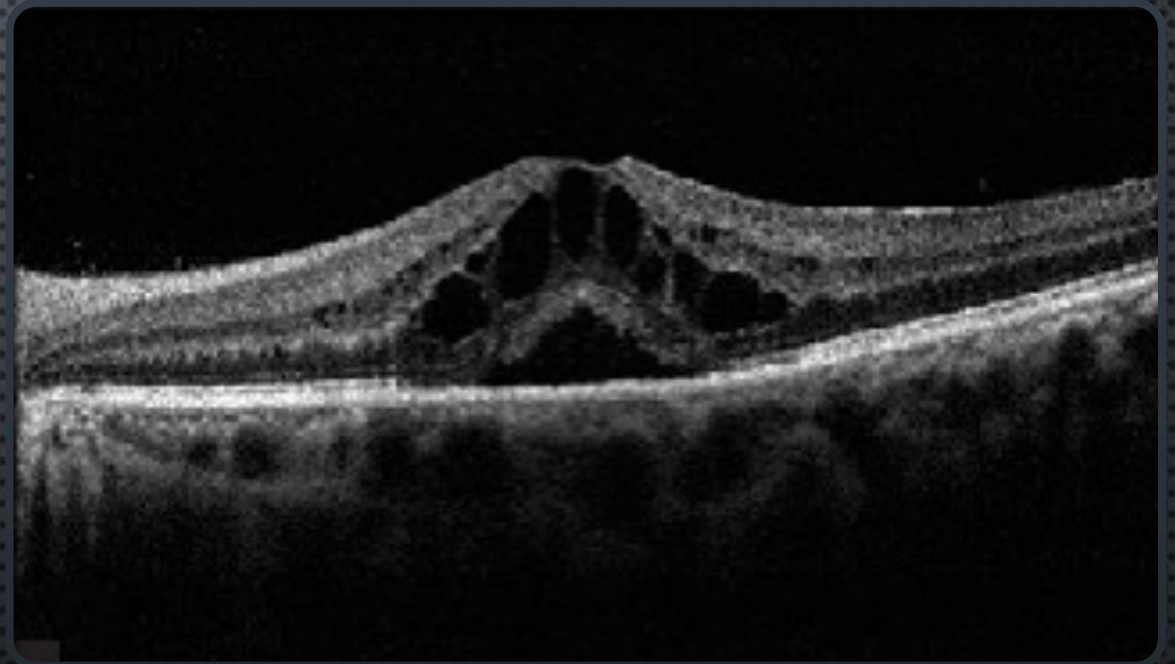


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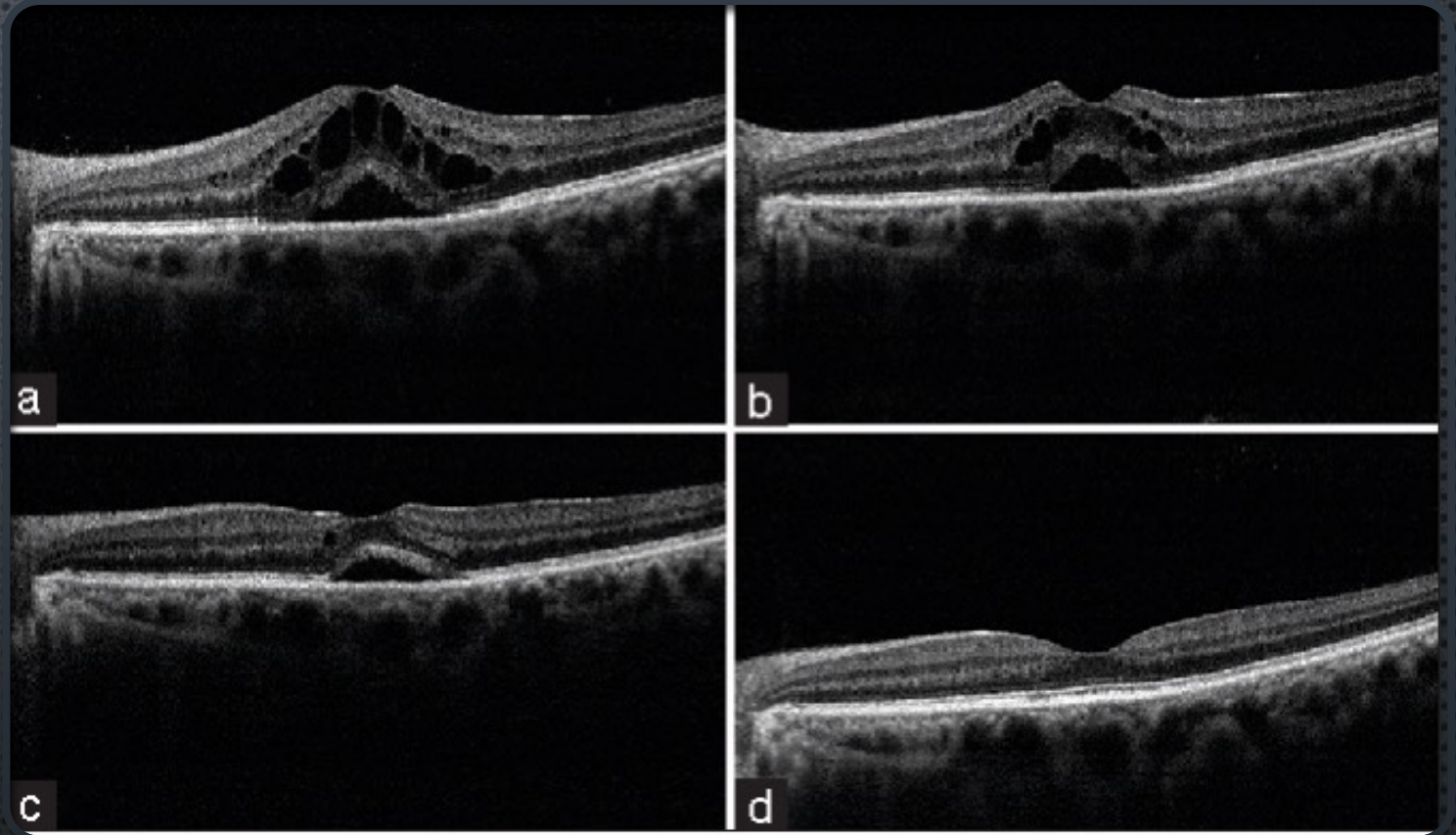
<https://stoneycreekeyecare.com/what-is-optical-coherence-tomography-oct/>



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**PLAQUENIL
TOXICITY:**

**CYSTOID
MACULAR
EDEMA**



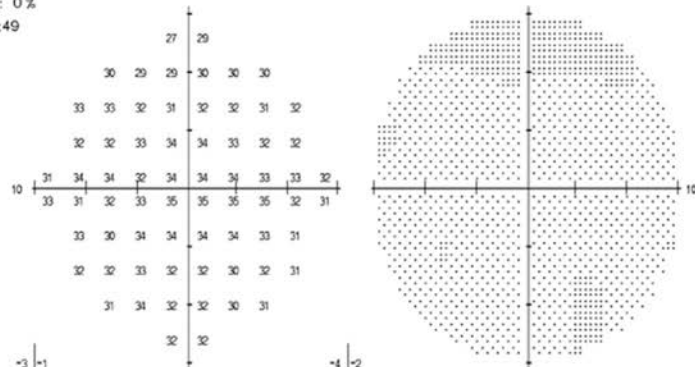
<https://www.semanticscholar.org/paper/Macular-edema-might-be-a-rare-presentation-of-Chang-Sheu/d03ccc6156082ff958cf837434b4e023de2b7bb6/figure/0>

NOT PERMANENT

Central 10-2 Threshold Test

Fixation Monitor: Gaze/Blind Spot Stimulus: III, White Pupil Diameter: 4.9 mm Date: 12-31-2012
 Fixation Target: Central Background: 31.5 ASB Visual Acuity: Time: 10:05 AM
 Fixation Losses: 0/15 Strategy: SITA-Standard RX: +3.25 DS +1.25 DC X 10 Age: 62
 False POS Errors: 0%
 False NEG Errors: 0%
 Test Duration: 05:49

Fovea: 38 dB

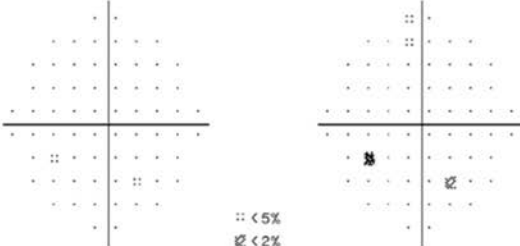


| | |
|------------------------|---------------------------|
| -3 -1 | -4 -2 |
| 0 -2 -2 -1 -1 -1 | -1 -3 -3 -2 -2 -2 |
| 2 1 0 -1 -1 0 -1 0 | 1 0 -1 -2 -2 -1 -2 -1 |
| 0 0 0 1 1 0 0 0 | -1 -1 -1 0 0 -1 -1 -1 |
| 0 1 1 -1 1 0 1 0 1 0 | -1 0 0 -2 0 -1 0 -1 -1 -1 |
| 1 -1 -1 0 1 1 1 1 0 -1 | 0 -2 -2 -1 0 0 0 0 -1 -2 |
| 0 -3 1 1 0 0 0 -1 | -1 -4 -1 0 -1 -1 -1 -2 |
| 0 0 0 -1 0 -2 0 -1 | -1 -1 -1 -2 -1 -4 -1 -2 |
| -1 2 0 0 -2 -1 | -2 1 -1 -1 -3 -2 |
| 1 1 | 0 0 |

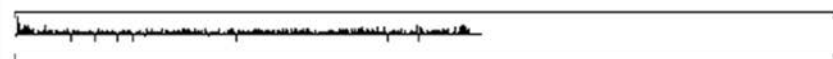
MD -0.17 dB
 PSD 1.09 dB

Total Deviation

Pattern Deviation



:: < 5%
 ☒ < 2%
 ☒ < 1%

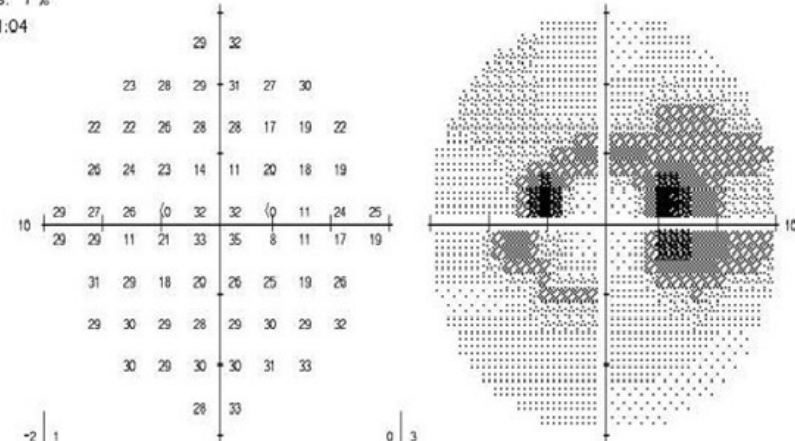


© 2010 Carl Zeiss Meditec
 HFA II 750-13946-5.1.1/5.1.1

Central 10-2 Threshold Test

Fixation Monitor: Blind Spot Stimulus: III, White Pupil Diameter: Date: 04-30-2013
 Fixation Target: Central Background: 31.5 ASB Visual Acuity: 20/20 Time: 08:31
 Fixation Losses: 2/20 Strategy: SITA-Standard RX: +1.00 DS DC X Age: 44
 False POS Errors: 0%
 False NEG Errors: 7%
 Test Duration: 11:04

Fovea: 35 dB

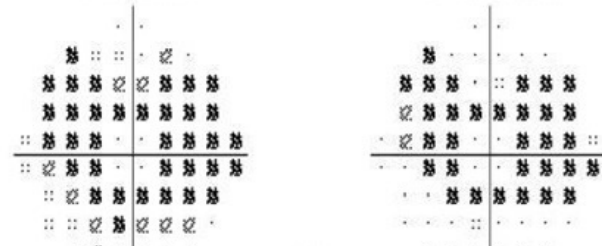


| | |
|------------------------------------|-----------------------------------|
| -2 1 | 0 3 |
| -9 -4 -3 -1 -5 -2 | -7 -2 0 1 -3 1 |
| +10 +11 +7 +5 +6 +16 +13 +10 | +8 +8 +5 +2 +3 +13 +11 +8 |
| -7 -9 -11 -20 -23 -14 -15 -14 | -5 -7 -9 -17 -21 -12 -13 -11 |
| -4 -7 -8 -36 -3 -3 -36 -23 -9 -7 | -1 -4 -5 -34 0 0 -34 -20 -6 -5 |
| -4 -4 -25 -14 -1 0 -27 -23 -16 -13 | -2 -2 -20 -11 1 3 -24 -21 -14 -11 |
| -3 +5 -17 +15 +9 +9 +15 +8 | 0 -2 +14 +12 +6 +7 +12 +5 |
| -4 -3 -4 -6 -5 -4 -4 -1 | -1 -1 -2 -3 -2 -1 -2 1 |
| -3 -4 -3 -3 -2 0 | 0 -2 0 0 0 2 |
| -4 1 | -2 3 |

MD -9.04 dB P < 1%
 PSD 8.12 dB P < 1%

Total Deviation

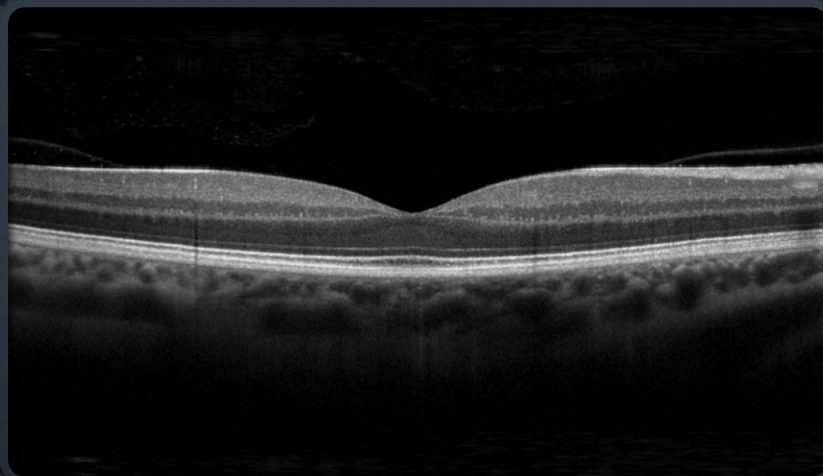
Pattern Deviation



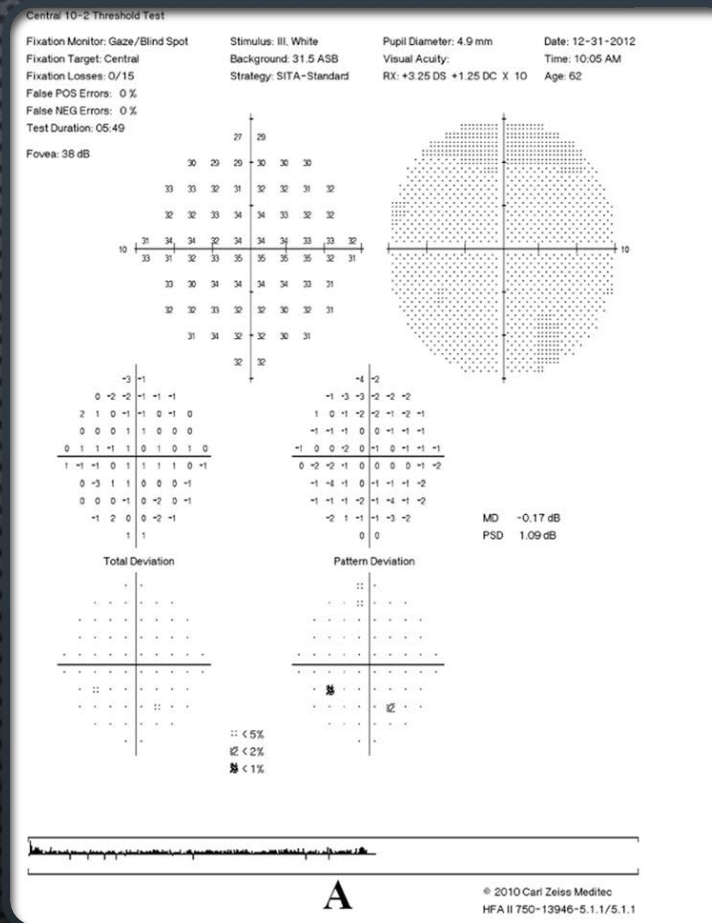
:: < 5%
 ☒ < 2%

EYE INSTITUTE AT STANFORD
 2452 WATSON COURT

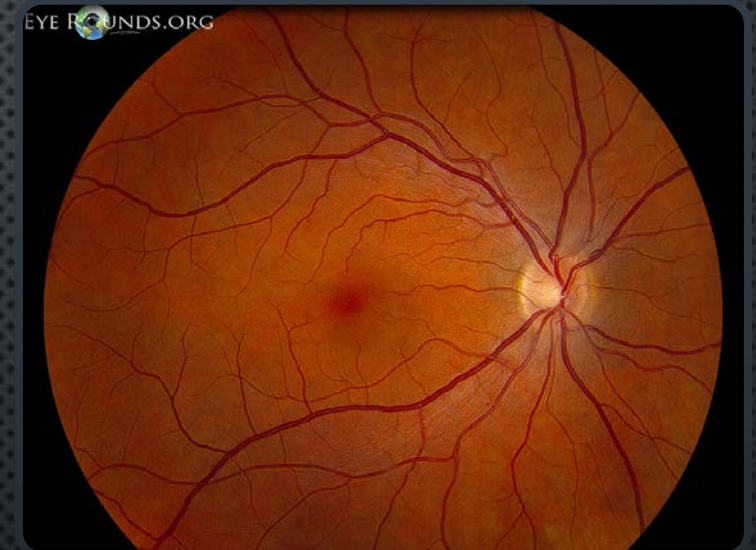
EYE EXAM



SD-OCT of the Macula



HVF 10-2 Test



Dilated fundus exam

CONCLUSION

- **PLAQUENIL IS A SAFE AND EFFECTIVE TREATMENT FOR LUPUS**
- PLAQUENIL HAS A WIDE VARIETY OF USES FOR DIFFERENT DISEASES THAT CAUSE INFLAMMATION
- RISK VS BENEFIT: BENEFITS OF DECREASED INFLAMMATION OUTWEIGHS RISK OF TOXICITY
- **YEARLY EYE EXAMS WITH SPECIALTY TESTING SCREEN FOR TOXICITY, WHICH IS RARE**

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QUESTIONS?

- THANK YOU!
- **ACCEPTING NEW PATIENTS – WOULD LOVE TO SEE YOU!**
- **517-627-3030**

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- GRAND LEDGE, MI 48837