STATE BOARD OF OPTOMETRY
2450 DEL PASO ROAD, SUITE 105, SACRAMENTO, CA 95834
P (916) 575-7170 F (916) 575-7292 www.optometry .ca.gov

Continuing Education Course Approval Checklist

Title: 2017 Spring Education Symposium - Updates on Hydroxycholoroquine Retinopath

Provider Name: Marshall B Ketchum University c/o Dr. John Lee

☑Completed Application
Open to all Optometrists? ☑Yes ☐No
Maintain Record Agreement? ☑Yes ☐No

☑Correct Application Fee

☑Detailed Course Summary

☑Detailed Course Outline

☑PowerPoint and/or other Presentation Materials

☑Advertising (optional)

☑CV for EACH Course Instructor

☑License Verification for Each Course Instructor
Disciplinary History? ☐Yes ☑No

AAOS

ASIAN AMERICAN OPTOMETRIC SOCIETY
PRESENTS

2017 Spring Education Symposium

Sheraton Cerritos Hotel - 12725 Center Ct Dr S, Cerritos, CA 90703
Sunday, April 2, 2017

5 HOURS OF CONTINUING EDUCATION

Agenda:

8:00am – 8:10am	**Welcome** Andy Kongsakul, O.D. President, AAOS
8:10am – 9:00am (1 Hour CE)	**10 LASIK Myth Busters** **SMILE – Small Incision Lenticule Extraction** Tom Tooma, MD, NVision Eye Centers
9:00am – 9:20am *(20 min)*	*Break*
9:20am – 11:00am (2 Hours CE)	**Topography Guided LASIK** Franklin Lusby, MD, NVision Eye Centers **Choosing Premium Lenses in Highly Aberrated Corneas** **Understanding New Extended Depth of Focus IOLs** Sheri Rowen, MD, NVision Eye Centers
11:00pm – 11:20pm *(20 min)*	*Break*
11:20am – 12:10pm (1 Hour CE)	**An Introduction to Fundus Auto-Fluorescence (FAF)** Raman Bhakhri, OD, Marshall B Ketchum University
12:10pm – 1:00pm (1 Hour CE)	**Updates on Hydroxychloroquine Retinpathy** Tina Zheng, OD, Marshall B Ketchum University

CALIFORNIA STATE BOARD OF OPTOMETRY

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CONTINUING EDUCATION COURSE APPROVAL APPLICATION

$50 Mandatory Fee

Cashiering and Board Use Only			
Receipt #	Payor ID	Beneficiary ID	Amount
1-2916	5414455	4402955	50

Pursuant to California Code of Regulations (CCR) § 1536, the Board will approve continuing education (CE) courses after receiving the applicable fee, the requested information below and it has been determined that the course meets criteria specified in CCR § 1536(g).

In addition to the information requested below, please attach a copy of the course schedule, a detailed course outline and presentation materials (e.g., PowerPoint presentation). Applications must be submitted 45 days prior to the course presentation date.

Please type or print clearly.

Course Title	**Course Presentation Date**
Updates on Hydroxychloroquine Retinpathy	12:00AM - 1:00PM 0 4 / 0 2 / 2 0 1 7

Course Provider Contact Information

Provider Name

John (First) Lee (Last) Howard (Middle)

Provider Mailing Address

Street 2575 Yorba Linda Blvd **City** Fullerton **State** CA **Zip** 92831

Provider Email Address jlee@ketchum.edu

Will the proposed course be open to all California licensed optometrists?	☑ YES ☐ NO
Do you agree to maintain and furnish to the Board and/or attending licensee such records of course content and attendance as the Board requires, for a period of at least three years from the date of course presentation?	☑ YES ☐ NO

Course Instructor Information

Please provide the information below and attach the curriculum vitae for each instructor or lecturer involved in the course. If there are more instructors in the course, please provide the requested information on a separate sheet of paper.

Instructor Name

Tina (First) Zheng (Last) (Middle)

License Number 15275	**License Type** Optometrist
Phone Number (714) 449-7401	**Email Address** tzheng@ketchum.edu

I declare under penalty of perjury under the laws of the State of California that all the information submitted on this form and on any accompanying attachments submitted is true and correct.

Signature of Course Provider — *Date* 2/14/2017

Tina Zheng, O.D.
Continuing Education
Asian American Optometric Society
April 2, 2017

Updates on Hydroxychloroquine Retinopathy

Summary

Hydroxychloroquine and chloroquine are widely used medications, especially in the treatment of malaria, rheumatoid arthritis, and systemic lupus erythematosus. Although in the United States hydroxychloroquine, due to its lower toxicity profile, has largely replaced chloroquine, hydroxychloroquine is still recognized to have ocular complications. Hydroxychloroquine retinopathy is classically characterized by parafoveal damage in a "bull's eye" pattern; however this is now recognized as a late finding. The use of newer, more sensitive technologies have allowed earlier detection and diagnosis.

Guidelines on hydroxychloroquine and chloroquine retinopathy released by the American Academy of Ophthalmology (AAO) have helped standardize the screening process. In its newest guideline released in 2016, the AAO updated the risk factors associated with retinopathy and revealed that there is a racial difference in the clinical presentation of the disease. Instead of the traditional parafoveal pattern, almost 50% of patients of Asian descent present with an extramacular pattern about eight degrees from the fovea. Automated visual fields, spectral domain optical coherence tomography, multifocal electroretinogram, and fundus autofluorescence continue to be the recommended screening tests for diagnosis.

It is important to recognize that once retinopathy develops, retinal damage can continue to progress for years afterward, even if the medication is discontinued. Therefore early detection of hydroxychloroquine retinopathy is imperative in minimizing retinal toxicity and preserving central vision.

Tina Zheng, O.D.
Continuing Education
Asian American Optometric Society
April 2, 2017

Updates on Hydroxychloroquine Retinopathy
Outline

1. General overview of chloroquine and hydroxychloroquine and its ocular side effects
2. Incidence of hydroxychloroquine retinopathy
3. American Academy of Ophthalmology guidelines, old and new
4. Screening tests
    a. Automated visual field
    b. Spectral-domain optical coherence tomography
    c. Multifocal electroretinogram
    d. Fundus autofluorescence
5. Case #1
6. Racial differences in hydroxychloroquine retinopathy
7. Pathophysiology
8. Comparing screening tests
9. Differential diagnoses
10. Case #2
11. Importance of screening
    a. What happens after cessation of hydroxychloroquine/ chloroquine
12. Cost utility of screening
13. Summary

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Southern California College of Optometry

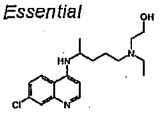
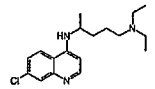
Updates on Hydroxychloroquine Retinopathy

Tina Zheng, OD
Assistant Professor
Southern California College of Optometry at MBKU

*No financial disclosures

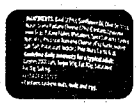
Chloroquine (CQ) & Hydroxychloroquine (HCQ)

- **Widely used medications**
  On World Health Organization's List of Essential Medications
- **Initially prescribed for malaria**
- **Later found to be effective for rheumatologic & autoimmune conditions**
- **HCQ largely supplanted CQ in US**

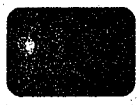



Ocular side effects


Corneal Verticillata

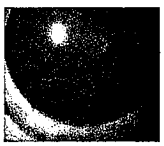

Accommodative Disturbance


Cataract


Retinopathy

Corneal Verticillata

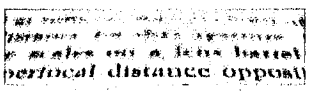
- **Ranges from diffuse punctate opacities to vortex-like deposits inferior**
- **Majority asymptomatic**
  <50% report visual disturbances (halos, photophobia)
- **Incidence CQ > HCQ**

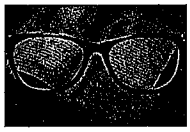


- Resolves with drug discontinuation
- No association with retinal toxicity

Accommodative Disturbance

- **Symptoms of blur, diplopia**
- **Reported with CQ use**
- **Resolves after drug discontinuation**





Cataract

- **Posterior subcapsular cataract**
- **Suggested association with CQ use**
- **No reports with HCQ use**

HCQ/CQ Retinopathy

- First case reported by Camiaggi in 1957
- Classically defined as "bull's eye" maculopathy

- "Bull's eye" now recognized as late finding
- Damage typically begins in parafoveal retina and spreads centrally

Symptoms

- Asymptomatic
- Difficulty reading
- Reduced vision/blur
- Metamorphopsia
- Color disturbance

Incidence of HCQ/CQ retinopathy

Levy et al 1997	• 1207 patients • 0.08% with definite toxicity • 0.4% with probable toxicity
Wolfe & Marmor 2010	• 3995 patients • 0.65% incidence
Melles & Marmor 2014	• 2361 patients • On HCQ ≥ 5 years • 7.5% incidence

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AAO Guidelines

AAO 2002 GUIDELINES

Recommended Tests

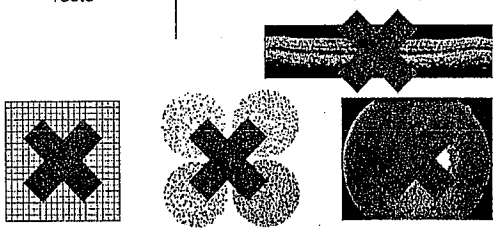
- Fundus photos
- AVF 10-2 or Amsler grid
- Color vision
- Multifocal ERG (mfERG)

AAO 2011 GUIDELINES

Recommended Tests

AVF 10-2 + one of the following:

- Spectral-domain OCT (SD OCT)
- Fundus Autofluourescence (FAF)
- Multifocal ERG (mfERG)



AAO 2016 GUIDELINES:
What's new?

Major Risk Factors:

- **Daily dose >5 mg/kg HCQ <u>real</u> weight**
- **Duration >5 years**
- **Renal disease**
- **<u>Tamoxifen</u> use (↑ risk by 5-fold)**
- **Pre-existing maculopathy**

Major Risk Factor:
HCQ daily dose >5mg/kg <u>real</u> weight

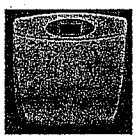
- **Previously emphasized ideal weight**
  - Thought that HCQ not stored in adipose tissue
  - Now known to be incorrect
  - Were overdosing thin individuals

Recent study found <u>real</u> weight is better predictor of risk

Melles RB, Marmor MF. The risk of toxic retinopathy in patients on long-term hydroxychloroquine therapy. JAMA Ophthalmol. 2014;132(12):1453-60.

Using Real Weight:

- **Standard dose for RA & SLE is 400mg/day HCQ**
- **5 mg/kg x ? kg = 400mg/day → 80 kg (176 lbs)**
- **Patients who take 400mg/day and are <176lbs are taking >5mg/kg/day**



AAO 2016 GUIIDELINES:
What's new?

Lesser Risk Factors:

- **Age**
- **Liver disease**
- **Genetics**

AAO 2016 GUIIDELINES:
Screening Frequency

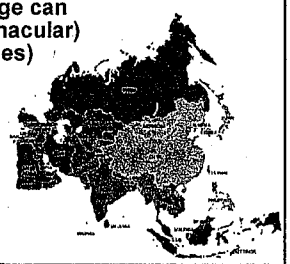
Baseline
- Fundus exam
- SD OCT and AVF only if (+)maculopathy

- Annual screening if high-risk
- SD OCT and AVF

5 Years
- Annual screening for everyone

AAO 2016 GUIIDELINES:
What's new?

Patients of Asian heritage can show peripheral (extramacular) damage (near the arcades)



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Screening Tests

AAO 2016 Guidelines

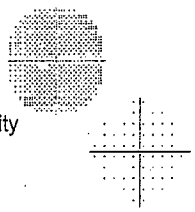
AAO 2016 GUIDELINES

Recommended Tests

- Automated Visual Fields (AVF)
- Spectral Domain Optical Coherence Tomography (SD OCT)
- Multifocal Electroretinogram (mfERG)
- Fundus Autofluorescence (FAF)

Automated Visual Field (AVF)

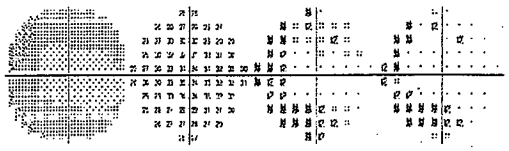
- **Subjective, Functional**
- **10-2 Pattern**
- **White SITA testing with pattern deviation (PD) plot**



- **Red targets**
  - More sensitive for early toxicity
  - Less specific and repeatable

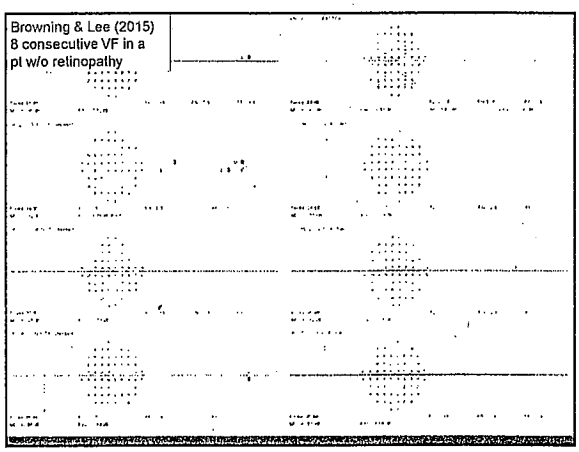
AVF in HCQ Retinopathy

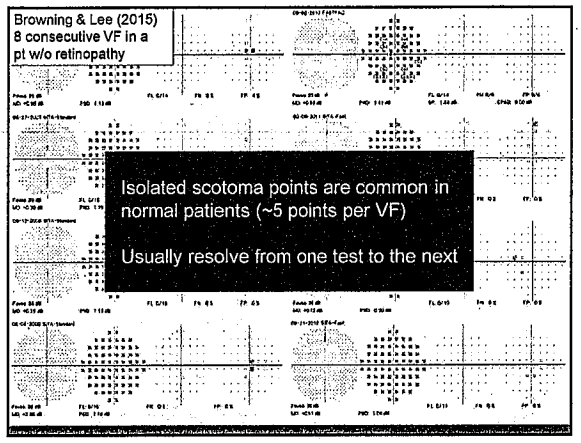
- **Parafoveal defects**
- **Parafoveal scotoma (early)**
- **Ring scotoma (moderate)**

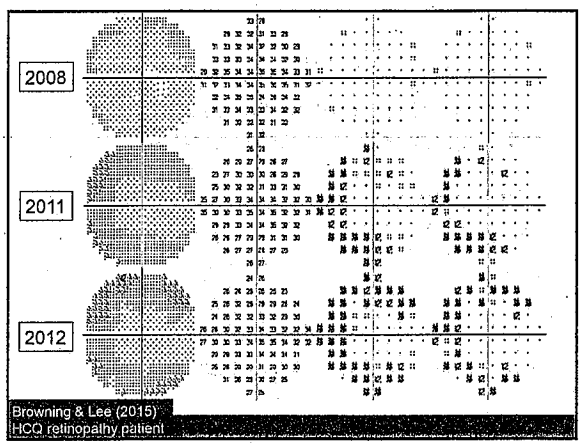


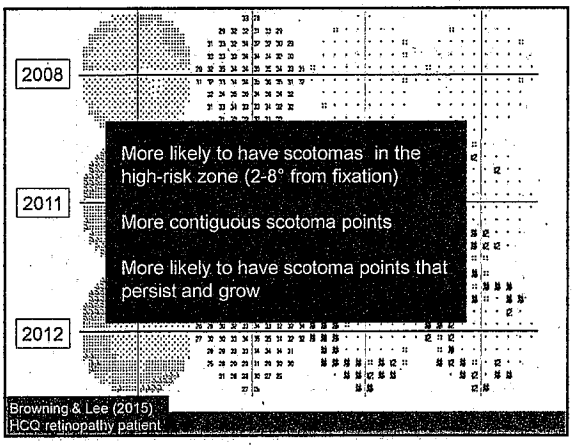
Scotoma analysis of 10-2 visual field testing with a white target in screening for hydroxychloroquine retinopathy *Browning and Lee (2015)*

- **Retrospective review of 31 patients**
  - 21 patients = no retinopathy
  - 10 patients = HCQ/CQ retinopathy
- **Excluded VF with 20% fixation loss or more**







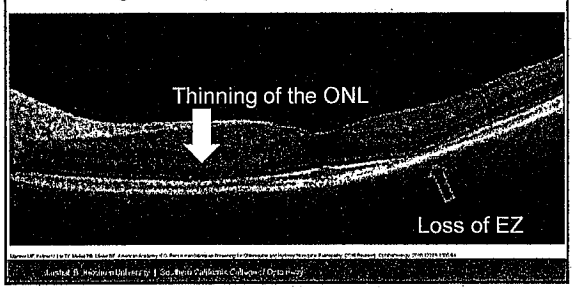


Spectral-Domain OCT (SD OCT)

- **Objective, Structural**
- **Qualitative and quantitative measurements**

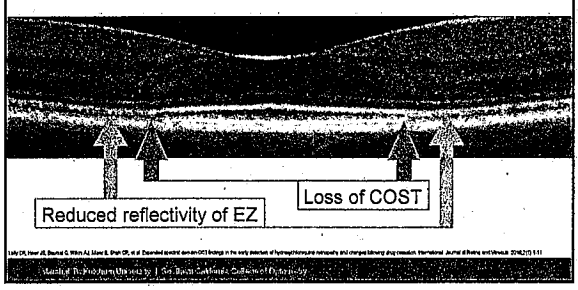
SD OCT: Early

- **Focal disruption/loss of the parafoveal EZ line**
- **Thinning of the parafoveal ONL**



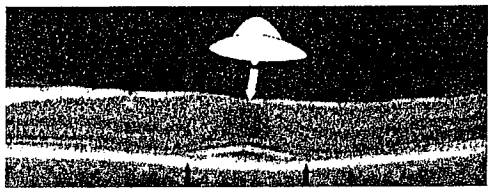
SD OCT: Early

- **Reduced reflectivity of EZ line**
- **Loss of COST line**



SD OCT: Early

- Parafoveal outer retinal thinning
- "Flying saucer" or "sombrero" sign



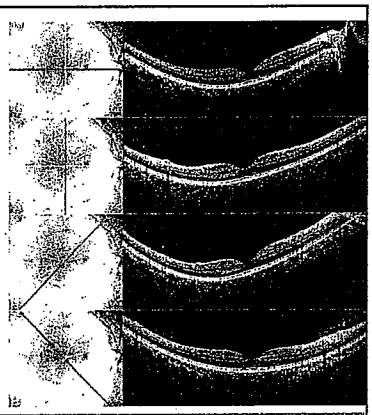
SD OCT Findings

Table 4. Earliest or Most Affected Quadrant of the Retina

Patient	Quadrant
E1	Temporal
E2	Inferonasal
E3	Temporal
M1	Inferotemporal
M2	Inferonasal
M3	Inferotemporal
M4	Inferotemporal
S1	Inferotemporal
S2	Unclear
S3	Inferotemporal

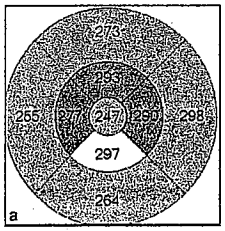
Marmor et al Comparison of screening procedures in hydroxychloroquine toxicity Arch Ophthalmol 2012;130(4):461-469

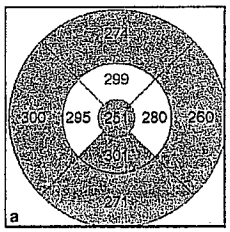
Need to perform multiple cross-sectional scans



SD OCT: Quantitative

- Parafoveal and perifoveal thinning
- Seen after focal disruption of structural lines



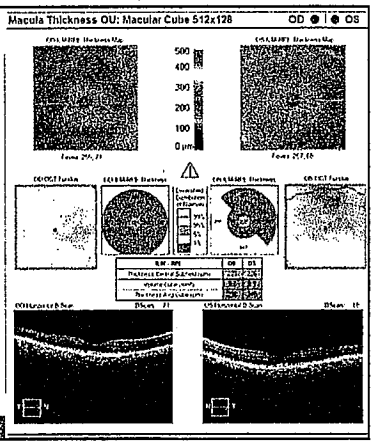


SD OCT: Late

- Diffuse outer retinal thinning
- No recognizable bull's eye pattern
- Loss of outer retinal segmentation lines and RPE

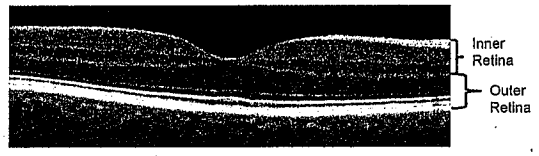
SD OCT: Late Quantitative

Severe parafoveal thinning & atrophy



SD OCT:
Do inner retinal changes come first?

- **Rosenthal 1978: Rhesus monkeys on CQ**
  Ganglion cells affected → photoreceptor/RPE



Manjunath, et al. Choroidal thickness in normal eyes measured using Cirrus-HD optical coherence tomography. Am J Ophthalmol. 2010;150:325-329.

Measuring the Inner Retina

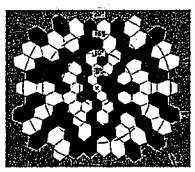
- **Cirrus SD OCT: Ganglion Cell Analysis (GCA)**
- **Optovue RTVue: Ganglion Cell Complex (GCC)**
- **Segmentation using computer algorithm**

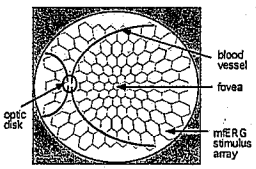
SD OCT:
Do inner retinal changes come first?

- **Some studies suggest inner retinal changes precede outer retinal changes**
  Small sample sizes (~10)
- **Studies have shown conflicting evidence**

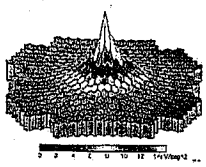
Multifocal ERG (mfERG)

- **Objective, Functional**
- **Evaluates retinal electrophysiological activity of photoreceptors and bipolar cells**
- **Central 30-50deg**

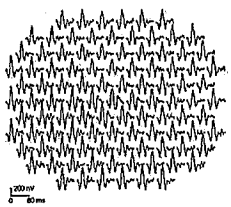




mfERG



Color Map



Trace Array

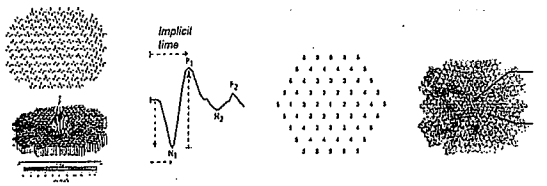
mfERG

Used by many studies as the "gold standard"

Sources of distortion:	Lower amplitudes in:
▪ Poor fixation ▪ Unstable electrode contact ▪ Continuous blinking	▪ High myopes ▪ Older age

mfERG

No gold standard on how to interpret for HCQ toxicity



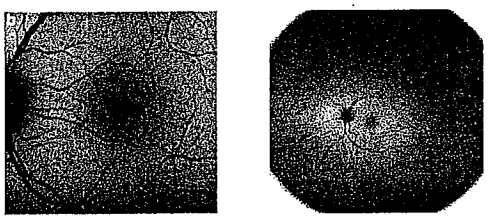
Amplitude reduction | Prolonged implicit time | Increased ring ratio | Color difference plots

Fundus Autofluorescence (FAF)

- **Objective, Structural**
- **Hyper-autofluorescent =**
  excess lipofuscin accumulation and photoreceptor damage
- **Hypo-autofluorescent =**
  RPE cell death/atrophy

FAF

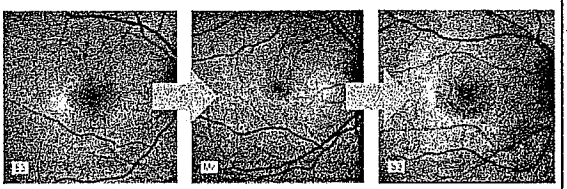
Heidelberg HRA | **Optos Ultra-Widefield**



488nm | *532nm, 633nm*

FAF in HCQ Retinopathy

- **Hyper-autofluorescent parafoveal ring**
- **Becomes hypo-autofluorescent over time**



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Case

73 yo African American Male

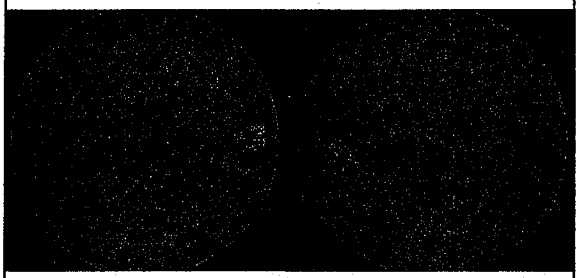
- **CC: Hydroxychloroquine annual screening**
- **Medical hx: Systemic lupus erythematosus**
- **Meds: Hydroxychloroquine (200mg BID x 1995)**

High Risk?

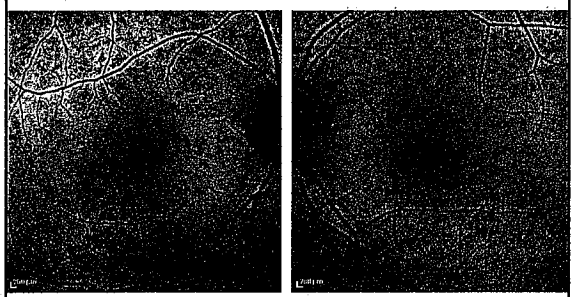
- Weight = 151.9 lbs (69kg)
- Dosing = 400mg/69kg → 5.8mg/kg/day (real wt)
- Duration = 18 years
- Renal disease = No

High risk?

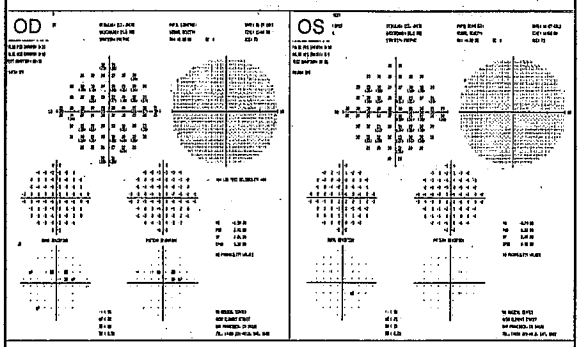
Fundus photos



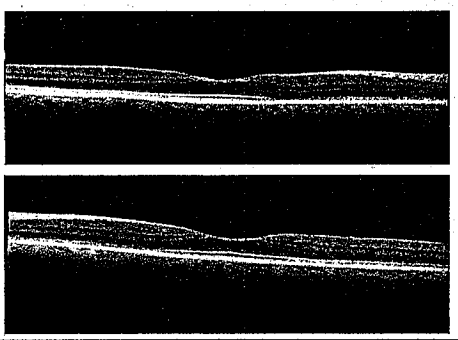
FAF



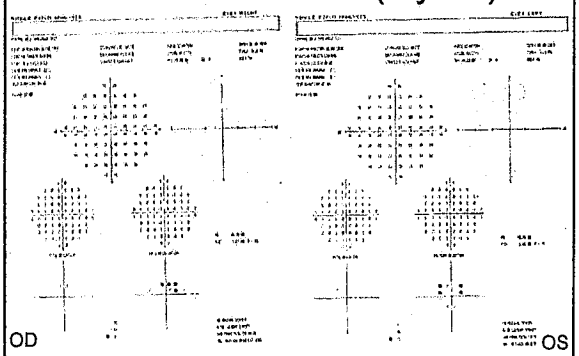
HFA Threshold 10-2



Spectralis SD OCT



HFA Threshold 10-2 (1 year)



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Racial Differences

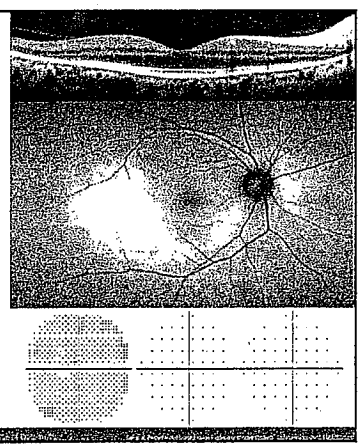
Racial Differences

- **Patients of Asian decent have strong predilection for pericentral / extramacular pattern of damage**
  East Asian, Southeast Asian, Filipino
- **8° or more from the fovea**
- **Mechanism unknown**

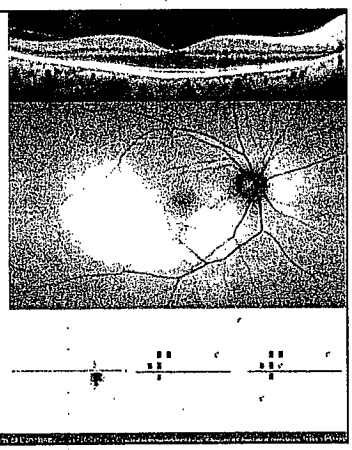
Racial Differences

- **Melles and Marmor (2015)**
  55% of Asians showed extramacular damage
  Northern CA Kaiser & Stanford Medical Center
- **Lee et al (2015)**
  8 of 9 Asian patients had extramacular damage
  Seoul, Korea

Extramacular damage

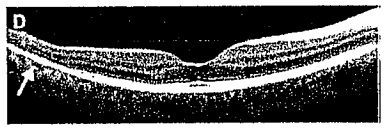


Extramacular damage



HCQ Retinopathy Patterns

Parafoveal



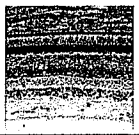
Extramacular

AAO 2016 Recommendations for Asian Patients

- **HVF 10-2 AND HVF 24-2 or 30-2**
- **Wide-field FAF suggested**
- **Wider angle SD OCT scans**

Pathophysiology of HCQ toxicity

- **Not well understood**
- **Metabolic demands greatest at the macula**
  High number of photoreceptors
- **HCQ/CQ: high affinity for melanin**
  RPE, choroid, iris

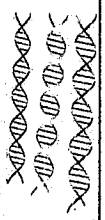


Pathophysiology

- **Rosenthal 1978: Rhesus monkeys on chronic CQ**
  Ganglion cell degeneration → photoreceptor/RPE
- **In vitro studies show CQ/HCQ increases permeability of the RPE layer**

Genetics

- **Studies have focused on ABCR (ABCA4)**
  Mutations shown to be associated with Stargardt and ARMD
- **Shroyer et al (2001):** ABCR mutations may predispose patients to developing toxicity
- **Grassman et al (2015):** Minor alleles of ABCR variants reduce susceptibility to toxicity



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Which screening test is best?

What is the best test?

- **Some studies suggest VF defects precede SD OCT findings**
  However most studies only perform **horizontal** cross-sections
- **SD OCT more reproducible**
- **FAF less sensitive for early change**
- **Not predictable which test will definitively show change first**

Relative Sensitivity and Specificity of 10-2 Visual Fields, mfERG, and SD-OCT in Detecting Hydroxychloroquine and Chloroquine Retinopathy

Browning and Lee 2014

- **Retrospective review of 121 patients on HCQ/CQ**
- **Large private practice**

Browning & Lee (2014)

Table 3 Sensitivity and specificity of ancillary tests for hydroxychloroquine retinopathy

Ancillary test	Sensitivity (%)	Specificity (%)
SD-OCT	78.6	98.1
10-2 VF	85.7	92.5
mfERG	92.9	86.9
10-2 VF + mfERG	100	82.2
10-2 VF + SD-OCT	85.7	92.5
mfERG + SD-OCT	100	86.0

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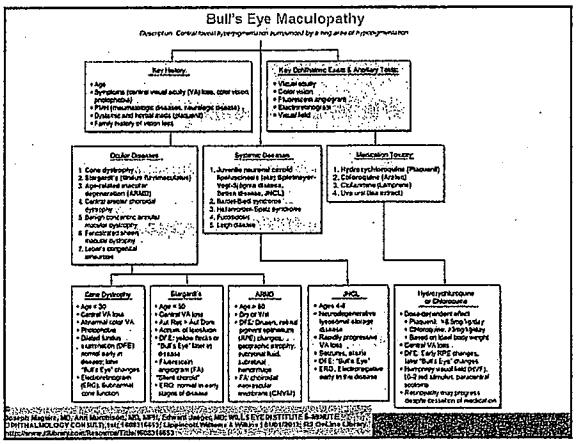
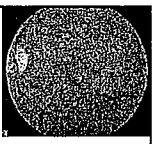
Differential Diagnoses



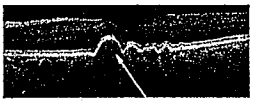
Bull's Eye Maculopathy: Differential Diagnoses

Ocular Conditions	Systemic Conditions	Medication Toxicity
• Cone dystrophy • Cone-rod dystrophy • ARMD • Stargardt / Fundus Flavimaculatus • Central areolar choroidal dystrophy • Benign concentric annular macular dystrophy • Fenestrated sheen macular dystrophy • Leber's congenital amaurosis	• Juvenile neuronal ceroid lipofuscinosis (Batten's disease) • Bardet-Biedl syndrome • Hallevorden-Spatz syndrome • Fucosidosis • Leigh disease	• Hydroxychloroquine • Chloroquine • Clofazimine • Uva ursi (tea extract)

Age-Related Macular Degeneration (ARMD)



- **Older patients (50+)**
- **Degenerative disorder of the retina**

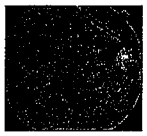


Characteristics

- Reduced central acuity
- Fovea usually involved
- Characterized by drusen & RPE changes/atrophy

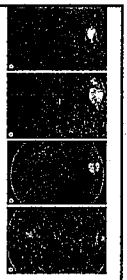
Stargardt Disease
Fundus Flavimaculatus

- **Onset in 1st-2nd decade or adult years**
- **Characterized by diffuse accumulation of lipofuscin**



Characteristics
- Reduced central acuity
- Fundus flecks, beaten-bronze appearance (can have geographic atrophy, bull's eye)

Cone Dystrophy
Cone-Rod Dystrophy



- **Onsets in 2nd- 4th decade**
- **Progressive hereditary disease**

Characteristics
- Poor visual acuity, photophobia, nyctalopia
- Abnormal photopic responses on ERG
- Pigmentary changes, progressive RPE atrophy at macula, possible bull's eye

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Case

82 year old WM

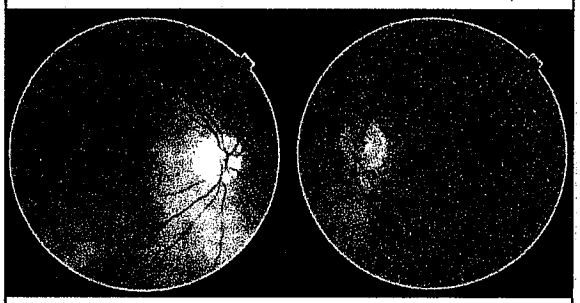
- **CC: Hazy vision OS>OD**
- **Ocular hx:**
  Early ARMD OU, Pseudophakia OD, Cataract OS
- **Systemic hx: Rheumatoid arthritis**
- **Meds: Hydroxychloroquine (200mg BID x 2004)**

High Risk?

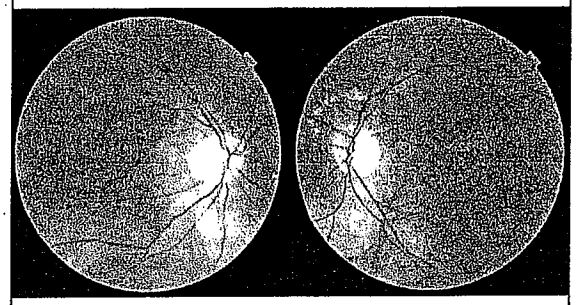
- **Weight = 204 lbs (93kg)**
- **Dosing = 400mg/93kg → 4.3mg/kg/day (real wt)**
- **Duration = 12 years**
- **Renal disease = No**

High risk?

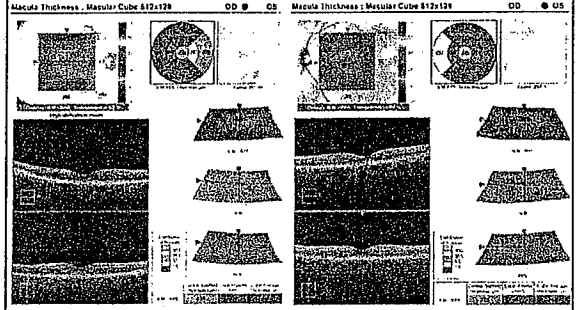
Fundus Photos



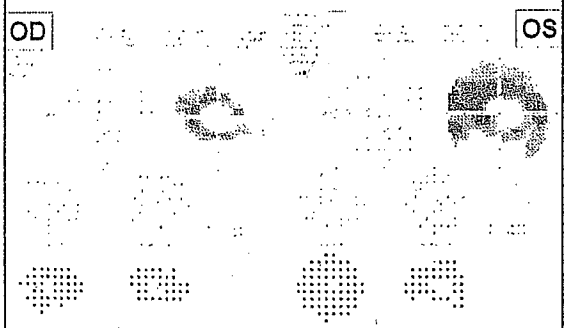
Fundus Photos



Macular OCT



HFA Threshold 10-2



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Why Screen?

Why is screening important?

- **Associated vision loss from retinopathy is irreversible**
- **Central vision can be preserved if toxicity detected early**
- **Continued damage after stopping medication depends on initial severity**

Why is screening important?

Multifaceted effects of hydroxychloroquine in human disease

Nancy J. Olsen, MD[a,*], Michele A. Schleich, BS[a], David R. Karp, MD, PhD[b]

- **PubMed search for HCQ in 2013**
- **Search limited to human clinical trials**
- **HCQ beneficial for non-rheumatic conditions**
  Diabetes mellitus, coagulopathy, dyslipidemia, infectious diseases, malignancy

Antimalarials may influence the risk of malignancy in systemic lupus erythematosus

G Ruiz-Irastorza, A Ugarte, M V Egurbide, M Garmendia, J I Pijoan, A Martinez-Berriotxoa, C Aguirre 2007

A favorable effect of hydroxychloroquine on glucose and lipid metabolism beyond its anti-inflammatory role

Mirella P. Hage, Marwa R. Al-Badri and Saml T. Azar 2014

Antidiabetogenic effects of hydroxychloroquine on insulin sensitivity and beta cell function: a randomised trial

Mary Chester M. Wasko[1] · Candace K. McClure[2] · Sheryl F. Kelsey[2] · Kimberly Huber[3] · Trevor Orchard[2,4,5] · Frederico G. S. Toledo[3] 2015

Can visual function improve after the drug is stopped?

Progression of Hydroxychloroquine Toxic Effects After Drug Therapy Cessation

New Evidence From Multimodal Imaging

Mihai Mititelu, MD, MPH; Brandon J. Wong, BA; Marie Brenner, MD; Paul J. Bryar, MD; Lee M. Jampol, MD; Amani A. Fawzi, MD

- 3 of 7 showed local regeneration/thickening of EZ line
- 2 of 7 showed VF improvement (reduction of depth/extent)

Can visual function improve after the drug is stopped?

Progression of Hydroxychloroquine Toxic Effects After Drug Therapy Cessation

New Evidence From Multimodal Imaging

Mihai Mititelu, MD, MPH; Brandon J. Wong, BA; Marie Brenner, MD; Paul J. Bryar, MD; Lee M. Jampol, MD; Amani A. Fawzi, MD

- Preservation of ELM
  - Seems to be associated with regeneration of photoreceptors & potential functional improvement

Figure 3. Intact External Limiting Membrane (ELM) and Photoreceptor Regeneration

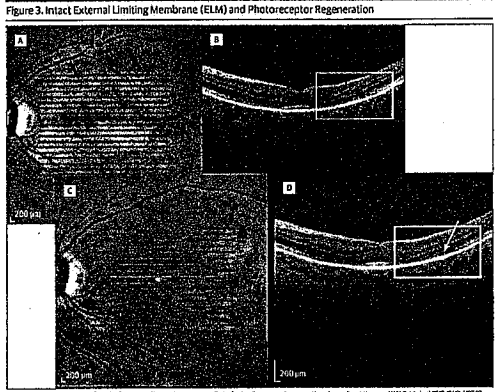
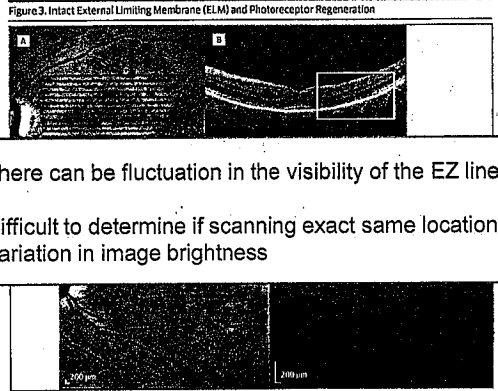


Figure 3. Intact External Limiting Membrane (ELM) and Photoreceptor Regeneration



There can be fluctuation in the visibility of the EZ line:

Difficult to determine if scanning exact same location
Variation in image brightness

Effect of Disease Stage on Progression of Hydroxychloroquine Retinopathy

Michael F. Marmor, MD; Julia Hu

- **Record review of 11 patients**
- **Followed 13-40 months after cessation**

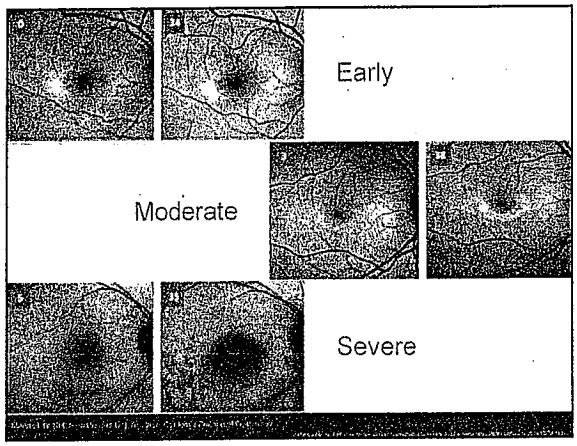
- **Early** = patchy parafoveal damage
- **Moderate** = 50-100% parafoveal ring damage
- **Severe** = bull's eye maculopathy, RPE damage

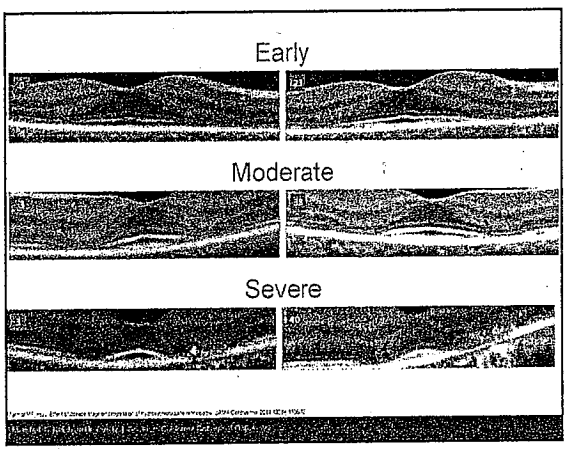
Marmor & Hu (2014)

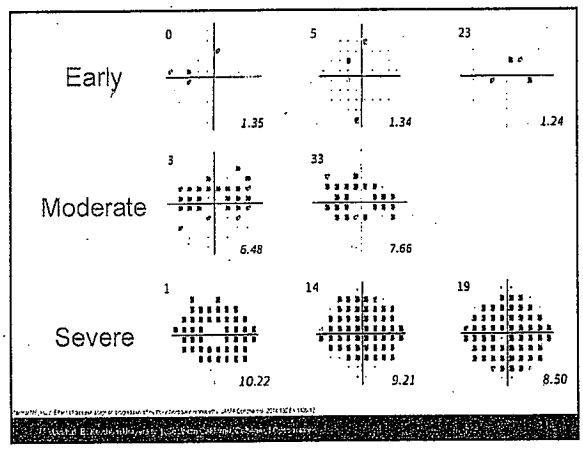
- Continued progression depends on severity of initial damage

- Early — Foveal thickness & RPE remained intact
- Moderate — Expansion of RPE damage & retinal thinning, worsening VA
- Severe — worsening VA

Foveal sparing determined by presence of RPE damage on OCT







Why does damage continue?

- **HCQ & CQ bind strongly to melanin**
  RPE may serve as a reservoir for toxicity
- **Clearance of HCQ/CQ takes several months**
- **Gradual decompensation of injured photoreceptors** (most likely)

Follow up after cessation

- **No recommended follow up guidelines after toxicity detected and drug stopped**
- **Annual VF and SD OCT may be beneficial until findings stabilize**

Adherence to screening guidelines

- **Reported toxic dosing rates: 12.8-74.7%**
  - Using 6.5mg/kg ideal weight as cut-off
- **~ 25% of high-risk patients lack regular eye care visits**
  - Many without diagnostic testing

Browning DJ. The Prevalence of Hydroxychloroquine Retinopathy and Toxic Dosing, and the Role of the Ophthalmologist in Reducing Both. Am J Ophthalmol. 2016. [e]

Adherence to screening guidelines

- **Those more likely to receive regular eye care:**
  - Patients managed by a rheumatologist
  - Patients with higher education

Browning DJ. The Prevalence of Hydroxychloroquine Retinopathy and Toxic Dosing, and the Role of the Ophthalmologist in Reducing Both. Am J Ophthalmol. 2016. [e]

Cost-utility of screening

- **From AAO 2002 to 2011:** added OCT, FAF, or mfERG in addition to HFA 10-2 threshold
- **Cost-utility increased 30-184%**
  - mfERG > FAF > OCT
- **40% increase in cost per patient since new guidelines**

McClellan AJ, Chang JS, Smiddy WEE. Aiming for the Bull's eye: The Cost-Utility of Screening for Hydroxychloroquine Retinopathy. Retina. 2016;36:1958-1963.
Browning DJ. Impact of the revised American Academy of Ophthalmology guidelines regarding hydroxychloroquine screening on actual practice. Am J Ophthalmol. 2013;155:418-428.

Summary

- **Incidence of HCQ retinopathy much higher than previously believed**
- **Recommended dose: ≤ 5mg/kg/day real weight**
- **No gold standard screening test**
- **Over 50% of patients of Asian descent show extramacular pattern of damage**
- **Early detection is key to preventing further vision loss**

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Questions?

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Thank You

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EDUCATION

Veterans Affairs Palo Alto Health Care System June 2016
Primary Eye Care and Low Vision Rehabilitation Resident

Southern California College of Optometry, Fullerton, CA May 2015
Doctor of Optometry

University of California Berkeley, Berkeley, CA May 2011
B.A. in Integrative Biology

OUTREACH EXPERIENCE

Southern Arizona VA Health Care System May 2014 – Aug 2014
Primary Eye Care, Low Vision Rehabilitation

Lemoore Naval Medical Center Aug 2014 – Nov 2014
Primary Eye Care

University Eye Center at SCCO Nov 2014 – Feb 2015
Primary Eye Care, Contact Lenses, Low Vision, Pediatrics

Southern Nevada VA Health Care System Feb 2015 – May 2015
Ocular Disease and Primary Eye Care

PROFESSIONAL EXPERIENCE

Primary Eye Care and Low Vision Rehabilitation Resident July 2015 - Present
Veterans Affairs Palo Alto Health Care System

- Provide primary optometric care to a diverse population of veteran patients
- Perform full-scope outpatient and inpatient low vision care in conjunction with blind rehabilitation center instructors
- Fit and assess medically necessary contact lenses, including soft, rigid gas permeable, and scleral contact lenses
- Participate in weekly journal clubs, core review studies, and didactic lectures
- Deliver three case presentations to the optometric community

Teacher's Assistant Nov 2012 – May 2014
Southern California College of Optometry, Fullerton, CA

- Aided students in numerous didactic classes and clinical skills labs
- Ocular Anatomy Lab, Clinical Methods I and II Lab, Clinical Medicine I Lab, Ophthalmic Optics I and II Lab, Ocular Health Procedures I Lab, Cornea and Contact Lenses I and II Lab, Strabismus and Amblyopia Management, CPR Certification Classes

Beta Sigma Kappa Tutor Aug 2012 – May 2014
Southern California College of Optometry, Fullerton, CA

- Assisted students in understanding and integrating various didactic concepts
- Helped students learn and improve on clinical techniques such as slit lamp examinations, binocular indirect ophthalmoscopy, and gonioscopy

Receptionist Low Vision Department Aug 2011 – Aug 2013
University Eye Center at SCCO, Fullerton, CA

- Scheduled appointments and verified insurance eligibility and benefits with Vision Service Plan, Medicare, and Medi-Cal plans

PRESENTATIONS AND POSTERS

Zheng T. Optic nerve head drusen. Jun 2016
Presentation at Optometry Resident Lecture Series
University of California, Berkeley, CA

Zheng T. Papilledema secondary to dural arteriovenous fistula. Feb 2016
Presentation at Optometry Resident Lecture Series
Veterans Affairs Palo Alto, CA

Zheng T, Vien L, Yang D. Ocular complications associated with idiopathic hypertrophic cranial pachymeningitis (IHCP) and subsequent vision rehabilitation. Oct 2015
Poster presented at American Academy of Optometry meeting, New Orleans, LA

Zheng T. HLA B-27 uveitis and post-cataract surgery. Sep 2015
Presentation at Optometry Resident Lecture Series
Veterans Affairs San Francisco, CA

HONORS AND AWARDS

Dr. Lawrence E. Gallarini Memorial Endowed Award for Excellence in Low Vision May 2015
Dr. Joe Dobbs Scholarship for Excellence in Low Vision Sep 2014
Blake Family Endowed Scholarship for Academic Excellence Sep 2013
Student Fellow of American Academy of Optometry Oct 2013
Dr. Herbert McCracken Dixon Memorial Endowed Scholarship Sep 2012

- To a student for the second highest GPA in the class

EXTRACURRICULAR

President Beta Sigma Kappa Optometric Honors Society May 2013-May 2014

- Organized on-campus tutoring program and increased tutoring hours by 20%
- Planned two mock proficiencies for clinical skill evaluation of the second-year class
- Assisted in the compilation and distribution of a clinic reference manual for students

Class Cabinet Secretary Aug 2012- May 2014

- Organized and maintained the class calendar
- Arranged class note-taking program and assembled contents and other academic resources onto the class website for easy access
- Assisted class cabinet with various fundraising events, end-of-the-year banquet, and sponsored lunches

PROFESSIONAL AFFILIATIONS

Student Member of American Academy of Optometry
National Association of Veterans Affairs Optometrists

INTERESTS

Ballet, contemporary dance, basketball, hiking, trying different cuisines