



**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:

Provider Name:

- 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



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## CONTINUING EDUCATION COURSE APPROVAL APPLICATION

**\$50 Mandatory Fee**

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.**

<b>Course Title</b> Understanding the Role of Meibemian Gland Dysfunction in the Dry Eyes	<b>Course Presentation Date</b> 01/06/2016
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<b>Course Provider Contact Information</b>	
<b>Provider Name</b> Lisette _____ Rosales _____ (First) (Last) (Middle)	
<b>Provider Mailing Address</b> Street <u>4353 Park Terrace Dr. #150</u> City <u>Westlake Village</u> State <u>CA</u> Zip <u>91361</u>	
<b>Provider Email Address</b> <u>lrosales@daughertylaservision.com</u>	
Will the proposed course be open to all California licensed optometrists?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> 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?	<input checked="" type="checkbox"/> YES <input type="checkbox"/> 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.

<b>Instructor Name</b> Tim _____ Trinh _____ (First) (Last) (Middle)	
<b>License Number</b> <u>13284T</u>	<b>License Type</b> _____
<b>Phone Number</b> <u>(805) 495-4625</u>	<b>Email Address</b> <u>alccoptometry@gmail.com</u>

**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

2.15.17  
 \_\_\_\_\_  
 Date

Tim Trinh presentation start and end times: 1:00 p.m.-2:00 p.m. = 1 hour

## Dr. Tim Trinh Paragraph Summary

The Underestimated Role of Meibomian Gland Dysfunction in Dry Eye Disease: This presentation is a review of the pathophysiology associated with MGD and discusses the role of hyperkeratinization of the terminal duct due to hormonal and environmental factors. Increase in lipid viscosity combined the keratinization will lead to glandular atrophy. Diagnosis of MGD requires good clinical slit lamp examinations, questionnaires and can benefit from meibography. The presentation discusses how to interpret meibography and a few cases and examples of Meibography related atrophy are presented.

# **Underestimated Role of Meibomian Gland Dysfunction in Dry Eyes**

**Mann (Tim) Trinh, O.D., F.A.A.O.**

277 Hampshire Road,

Thousand Oaks, CA 91361

## **Outline:**

### **Anatomy:**

- 1) Arrangement of Meibomian Glands
- 2) Dimensions of Glands
- 3) Embryologic Development
- 4) Histologic appearance of Meibomian Glands
  - a. Role of Acinus, Connecting Ductules, Central Ducts, Excretory Duct

### **Physiology of Meibomian Glands**

- 1) Secretion Mode
- 2) Mechanisms of Secretion and Delivery
- 3) Lid Topography and Meibomian Gland Function
- 4) Innervation
- 5) Keratinization

### **Lipid Synthesis in Meibomian Glands**

- 1) Review of fatty acid synthesis
- 2) Proteins and the meibomian gland
- 3) Physical Properties of Meibomian Lipids
- 4) Regulation of Meibomian Gland in Health and Disease

### **Androgens and role in regulation of sebaceous glands**

- 1) Influence of Androgen Deficiency and Treatment
- 2) Estrogens Regulation of Sebaceous Glands
- 3) Estrogen regulation of Meibomian Glands
- 4) Progestin Regulation of Sebaceous Glands
- 5) Progestin Regulation of Meibomian glands
- 6) Sex Steroid Involvement in Sex Differences in Meibomian Glands
- 7) Effect of All Trans Retinoic Acid on Meibomian Gland.

### **Pathophysiology and Pathology**

- 1) Hyperkeratinization is major reason for obstructive MGD.
- 2) Cytology of Meibum: Meibomian Secretion.
- 3) Acinar Atrophy
- 4) Influence of Aging
- 5) Basement Membrane Thickening of Acini

- 6) Influence of Blood Supply
- 7) Role of inflammation

### **Interacting Pathways in the Pathogenesis of MGD**

- 1) Obstruction
- 2) Hyperkeratinizations
- 3) Altered Cell Differentiation
- 4) Seborrhea
- 5) Influence of Bacteria
- 6) Inflammatory Mediators
- 7) Physiological Aging Process
- 8) CL Wear

### **Diagnosis:**

- 1) Clinical tools available for imaging

### **Treatments:**

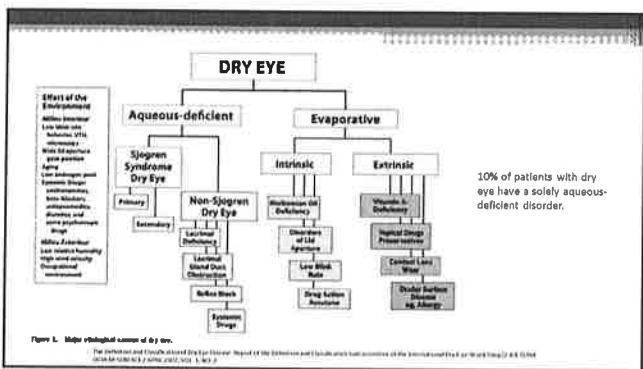
- 1) Lipiflow, Miboflow, Blephex, Treatment protocols
- 2) Role of Omega 3's and therapy
- 3) Anti-inflammatory

## Understanding the Role of Meibomian Gland Dysfunction in Dry Eyes

Tim Trinh, O.D., F.A.A.O.  
 All EyeCare Optometry  
 CEO Box Medical Solutions  
 Date: November 6th, 2016

### Learning Objectives

- Learn to differentiate Aqueous Deficient Dry Eyes and Evaporative Deficient Dry Eyes
- Understand how to diagnose Meibomian Gland Dysfunction
- Understand principles and application of Meibography



### Practical Assessment of Dry Eye Tests

- Patient Questionnaire – OSDI, SPEED TEST
- Patient Health History
- Tear Film Break Up Time
- Tear Meniscus
- Ocular Surface Staining with Fluorescein and Lissamine Green
- Examination of Eyelid Margins and Meibomian Gland orifices with expression of Meibomian Gland Dysfunction

**Patient Health History**

Table 1: Patient Demographics

Field	Value
Age	55
Sex	Female
Medical History	Diabetes, Hypertension, Asthma
Medications	Insulin, Lisinopril, Albuterol

Table 2: Dry Eye Test Results

Test	Result
OSDI	25
SPEED	15
Tear Meniscus	Normal
Ocular Surface Staining	Mild

Graph: Tear Film Break Up Time (TFUT) vs. Time (min)

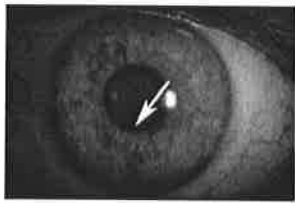
### Patient Health History

**Risk factors for dry eye disease (1)**

- **High level of evidence**
  - Age
  - Female sex
  - Postmenopausal estrogen therapy
  - Arthritis/rheumatism
  - Collagen vascular disease
  - Ocular refractive surgery
  - Irradiation
  - Hematopoietic stem cell transplantation
  - Vitamin A deficiency
  - Hypothyroidism
  - Androgen insufficiency
- **Moderate level of evidence**
  - Medications such as topical anticholinergics, selective serotonin reuptake inhibitors, diuretics, beta blockers
  - Diabetes mellitus
  - HSV1/HSV2 infections
  - Systemic chemotherapy
  - Cataract surgery with a large incision
  - Keratoconus
  - Bushy brows
  - Low air humidity
  - Sarcoidosis
  - Oversin dysfunction
- **Low level of evidence**
  - Smoking
  - High altitude
  - Anticholinergic drugs such as atropine, antiparkinsonics
  - Alcohol
  - Methicillin
  - Dobutamine eye drops
  - Acne
  - Cold
  - Oral contraceptives
  - Pregnancy


Elizabeth M. Messier. The Pathophysiology, Diagnosis, and Treatment of Dry Eye Disease. Ocul. Clin. 2015; 112:71-82

### Tear Break Up Time



Normal range lies between 20 and 30 seconds.  
 <10 seconds Dry Eyes  
 <5 seconds Severe Dry Eyes

### Temporal Lid Parallel Conjunctival Folds

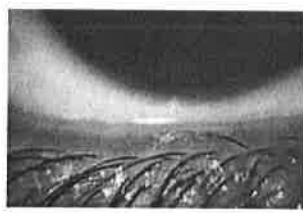


Slit Lamp Evaluation Lid Parallel Conjunctival Folds:  
 Results from increased friction between the lids and conjunctiva.  
 Graded Scale 0-3  
 84.9% Sensitivity for Dry Eyes  
 90% Specificity for Dry Eyes

**Table 1**  
 Main classification of lid-parallel conjunctival folds (LJ)  
 0 Grade 0 No lid-parallel conjunctival folds (LJ)  
 1 Grade 1 Small (1-2 mm)  
 2 Grade 2 Full width of the vertical height of the conjunctiva  
 3 Grade 3 Full height of the vertical height of the conjunctiva


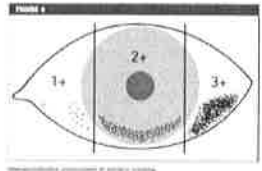
Elizabeth M. Amsamer. The Pathophysiology, Diagnosis, and Treatment of Dry Eye Disease. Oculat. 2015; 112:71-82

### Tear Meniscus



>0.2-0.4 mm Normal  
 <0.2 mm Hyposecretion – Think Aqueous Deficiency  
 >0.40 mm Hypersecretion

### Corneal Staining and Grading

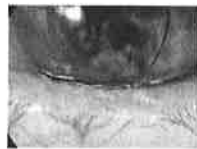
**Figure 1**  
 International assessment of corneal staining  
 1+ Superior staining (superior 1/3 of cornea)  
 2+ Central staining (central 1/3 of cornea)  
 3+ Inferior staining (inferior 1/3 of cornea)

### What is Meibomian Gland Dysfunction?

- Hyperevaporative disorders, mostly caused by dysfunction of the Meibomian glands, and mixed hyperevaporative/aqueous-deficient forms account for more than 80% of cases
- **Meibomian gland dysfunction** is blockage or atrophy of the meibomian glands resulting in decreased lipid production.

### Clinical Signs of MGD

Lid Signs	Expressed Meibum
- Vascularized Lid Margins	0 = Clear
- Altered Mucocutaneous Junction	1 = Cloudy
- Orifices-plugged/retroplaced	2 = Cloudy; particulate
- Ducts Exposed/retroplaced	3 = Toothpaste
- Mars's Line Displaced	



Irregular Lid Margins



### Arrangement of Meibomian Glands

Heinrich Meibom (1638-1700) first published in 1666.

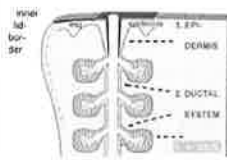
Number of upper glands: 25-40, Median: 31  
 - Average length: 5.5mm  
 - Calculated volume: 26 microliters

Number of lower glands: 20-30, Median: 26  
 - Average length: 2 mm  
 - Calculated volume: 13 microliters



Salomo O. Atlas der Anatomie des Menschen, Femer 11, Grazesand J. 606, Ed. 18, Vol. 1, p. 213, Urban & Schwarzenberg, 1982

### Histologic Appearance of Meibomian Glands



Elek-Kries, V. Atlas of Histology, 2nd Edition, 1982, and Elek-K. 2nd Edition, 1982

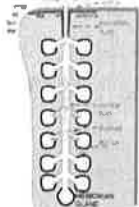
**Acinus:** 150-200 um diameter  
 - Contain secretory cells called meibocyte  
 - Meibocyte develops on outer layers and migrate centrally

**Connecting Ductule:** 150um long and 30-50um wide  
 - stratified squamous epithelium

**Central Duct:** 100-150um in diameter, wider lumen  
 - stratified squamous epithelium

**Excretory Duct:** 0.50mm long  
 - cornified epithellum

### Histologic Appearance of Meibomian Glands



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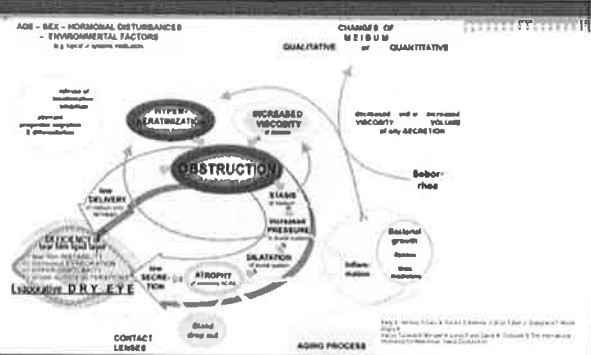
### Physiology of Meibomian Glands



Greater build up of Meibum during the sleeping hours.

Mechanical contraction of M. Orbicularis muscle during blink milks glands towards external epidermis with relaxation of marginal muscle of Riolan leading to the expression. Muscles work in opposition

Active glands in only 45% of gland openings at one time and a decrease of Active glands by 50% between age 20 to 80.



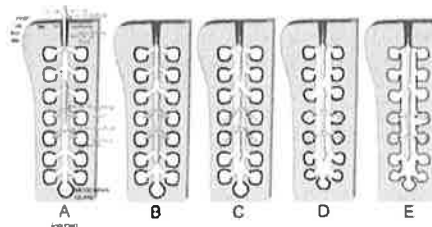
### Hormonal Factors Impacting Sebaceous Gland and Lipid Production

Factor	Growth	Lipid Production	Pathophysiology
Androgen (ex. Aldosterone, Testosterone)	Increase	Increase	Downregulates keratinization and upregulates lipid production through gene regulation
Estrogen	Decrease	Decrease	Upregulates genes associated with lipid breakdown and suppresses genes with lipid formation.
Insulin	Increase	Increase	Aids in chemical reaction by activating HMG reductase in Lipid Formation Cascade

### External Factors Leading to Meibomian Gland Dysfunction

Factors	Observations
Environmental – Computer Usage	Increased stasis of Meibum leading to increased blockage
Aging	Blockage and Atrophy
Contact Lens Wear	Pre-mature drop out of meibomian glands. Etiology unknown.
Seborrhea	Bacteria on eyelids can break down fatty acids that can penetrate the epidermis of eyelids and cause inflammation and hyperkeratinization
Retinoid (Isotretinoin) – Proactive Acne Medication and Anti-Aging Make Up	Thickening and keratinization of ducts, necrosis of meibomian gland acinar.

### Pathophysiology of Meibomian Gland Dysfunction



### Available Meibographs:



### Application of Meibography Imaging

- Ability to visualize obstructions that may be occurring underneath surface of lids
- Establishing baseline measurements prior to contact lens wear
- Pre-screen candidates for Meibomian Gland Dysfunction related dry eye complications.
- Enhance surgical outcome by proactively treating dry eyes.
- Set patient expectations for dry eye related complications that may not be surgically related.
- Monitor impact of Hormone Replacement Therapy on MGD

### Meibography Gland Grading



Meiboscale	Area of Loss
	Grade 0 0%
	Grade 1 5.23%
	Grade 2 24% - 58%
	Grade 3 5.7% - 75%
	Grade 4 100%

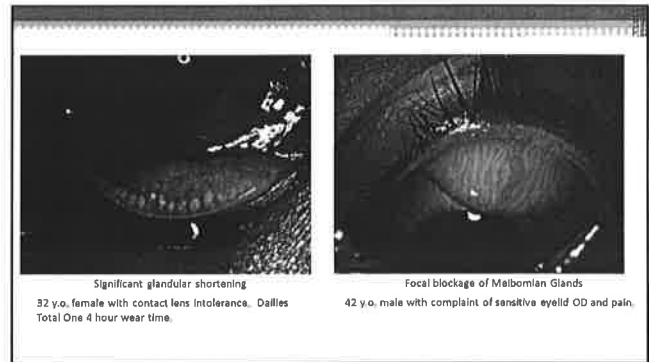
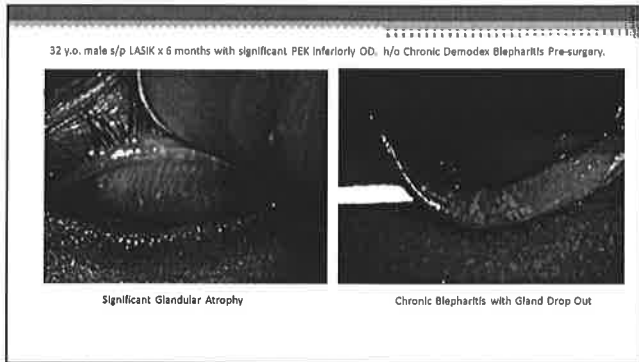
86 y.o. post PRK procedure with complaints of significant dry eyes and history of Restasis usage with no relief.



Ductal Dilatation of Acinar Structures



Initial Atrophy of Glands



### Lipiflow in Office Treatment Therapies

**Lid Wiper:** Sweeps away debris and mucus from the lid margin.

**Heat Cup:** Delivers heat to the meibomian glands from the inside of the eye.

**Thermal Probe:** Delivers heat to the meibomian glands from the inside of the eye.

**Heat Gel:** Delivers heat to the meibomian glands from the inside of the eye.

**Thermal Paddle:** Delivers heat to the meibomian glands from the inside of the eye.

**Ultrasound Gel:** Delivers heat to the meibomian glands from the inside of the eye.

**Treatment:** Heat pulsation therapy from inside out.  
**Pro:** Pulsation and heating meibomian glands and has been shown to provide relief for 1 year.  
**Con:** Cost to patient and replacement parts.

### Miboflow In Office Therapy

**Treatment:** Heat transfer using Thermal paddle and ultrasound gel.  
**Pro:** Low cost effective treatment  
**Con:** No studies for long term efficacy, may require 2-3 visits for longer lasting effects.

### Conclusion:

- Treatment of dry eyes requires the proper assessment to aid in the classification of evaporative versus aqueous deficiency.
- External lid margin slit lamp evaluations can provide significant clues towards the underlying possibility of Meibomian Gland Dysfunction.
- Meibography can provide valuable information for long term dry eye management by creating a comprehensive and repeatable baseline measurement.

# THANK YOU

Adventure Works: The ultimate source for outdoor equipment

## Questions?

### References:

Arita R, Itoh K, Inoue K, Kuchiba A, Yamaguchi T, Amano S. Contact lens wear is associated with decrease of Meibomian glands. *Ophthalmology*. 2009;116:379-384.

Arita R, Itoh K, Inoue K, Amano S. Noncontact infrared meibography to document age-related changes of the meibomian glands in a normal population. *Ophthalmology*. 2008;115:911-915.

The Definition and Classification of Dry Eye Disease: Report of the Definition and Classification Subcommittee of the International Dry Eye Work Shop (2007) *THE OCULAR SURFACE* / APRIL 2007, VOL. 5, NO. 2

Hellgenhaus A, Koch JM, Kruse FE, Schwarz C, Waubke TN: Diagnosis and differentiation of dry eye disorders]. Diagnostik und Differenzierung von Benetzungstörungen. *Der Ophthalmologe* 1995; 92: 6-11.

Tong L, Chaurasia SS, Mehta JS, Bauerman RW: Screening for meibomian gland disease: its relation to dry eye subtypes and symptoms in a tertiary referral clinic in Singapore. *Invest Ophthalmol Vis Sci* 2010; 51: 3449-54.

Erich Knop, Nadja Knop, Thomas Millar, Hiroto Obata, and David A. Sullivan The International Workshop on Meibomian Gland Dysfunction: Report of the Subcommittee on Anatomy, Physiology, and Pathophysiology of the Meibomian Gland IOVS, Special Issue 2011, Vol. 52, No. 4

Gerd Geerling,<sup>1</sup> Joseph Tauber,<sup>2</sup> Christophe Baudouin,<sup>3</sup> Eri Goto,<sup>4</sup> Yukihiko Matsumoto,<sup>5</sup> Terrence O'Brien,<sup>6</sup> Maurizio Rolandi,<sup>7</sup> Kazuo Tsubota,<sup>5</sup> and Kelly K. Nichols<sup>8</sup> The International Workshop on Meibomian Gland

## **Mann D. Trinh, O.D., FAAO – TPG Certified**

Office number: 805-495-4625

Email: [AECOptometry@gmail.com](mailto:AECOptometry@gmail.com)

### **EDUCATION**

#### **Veterans Affairs (VA) Central California Health Care System**

Optometric Residency – July 1st, 2007 to June 30th, 2008

Emphasis: Management and treatment of ocular disease including glaucoma treatment and management, diabetic examinations, cataract evaluations and co-management.

Minor Emphasis: Low vision, specialty contact lens fitting, specialty procedures

**Completed Advanced Competence in Medical Optometry** – National Board of Examiners in Optometry 2010.

#### **University of California Berkeley, School of Optometry**

Doctor of Optometry

Degree conferred: May 2007

#### **University of California, Los Angeles**

Bachelors of Science in Biochemistry

Degree conferred: June 2003

### **WORK EXPERIENCE**

#### **All EyeCare Optometry (Owner) – (August 2010 – Current)**

Description: Primary care optometry, medically necessary contact lenses and emergency medical eye care.

#### **Independent Optometrist – (December 2008-2011)**

Description: Contract doctor for private offices, ophthalmology (LASIK and General Ophthalmology) practices, commercial practice.

#### **Alpert Vision Care – (August 2009- October 2010)**

Description: Primary care optometry

Address: 20929 Ventura Blvd., Woodland Hills CA 91364

#### **Wink Optometry - (August 2009- October 2010)**

Description: Primary care optometry

Address: 4783 Commons Way, Calabasas CA 91302

#### **California Eye Specialists - (October 2008 to December 2008)**

Description: Primary care optometry in an ophthalmology setting. Pediatric to geriatric exams and specialty contact lens fittings.

Address: 855 W. Foothill Blvd., Monrovia, CA 91016

#### **Fresno VA – Fee-Basis Contractor - (July 1, 2008 to September 1, 2008)**

Description: Primary care optometry in a high pathology clinical setting with emphasis on geriatric ocular diseases.

Address: 2615 E. Clinton Ave., Fresno CA 93703

#### **Clinical Research Center (May 2004 to August 2004)**

*Clinical Research Assistant under Dr. Meng Lin, O.D. for contact lens solutions study*

Description: Responsible for subject recruitment and screening, providing explanation of patient protocols, scheduling, management and payment of subjects.

### **FOURTH YEAR CLINICAL OUTROTATION EXPERIENCE**

#### **VA Central California Health Care System (May 2006 to August 2006)**

Preceptors: Barnie Lim O.D., FAAO; Nicholas Chan O.D., FAAO

Description: Hospital based optometry

**Alameda Medical Center** (*August 2006 to October 2006*)

Preceptor: Glen Ozawa O.D., FAAO

Description: Community based outpatient clinic in an underprivileged neighborhood. The patient population ranged from pediatric to geriatric examinations with a heavy prevalence of ocular diseases.

**Vandenberg Airforce Base** (*October 2006 to December 2006*)

Preceptor: Lt. Col. Timothy Nelson O.D.

Description: Military based optometric clinic with patient population ranging from infant toddler to geriatric.

**VA San Francisco Medical Center** (*January 2007 to March 2007*)

Preceptors: Bernard Dolan M.S., O.D., FAAO; Andrew Mick O.D., FAAO

Description: Primary care optometry with emphasis on geriatric ocular diseases.

**University of California Berkeley, School of Optometry Contact Lens Clinic**

Description: Advanced contact lens fitting including RGP, multifocal lenses, keratoconus fitting, bitoric fittings.

**AWARDS**

**Vision West Annual Scholarship Award 2007**

**Walman Optical Leadership Scholarship 2006 – 2007**

**California Optometric Association**

**George I. Dean, Jr., OD Memorial Fund Leadership Award 2006 – 2007**

**Berkeley Optometry Leadership Grant 2004 – 2005**

**PROFESSIONAL  
AFFILIATIONS**

**Fellow American Academy of Optometry – Inducted 2010**

**American Optometric Association: *Member***

**California Optometric Association: Communications Officer - current**

**LECTURES**

**An examination of a patient with Lipemia Retinalis**

Presented at Berkeley Practicum Continuing Education Program, January 2008

Presented at Resident Conference UC Berkeley School of Optometry, August 2007

Digital Poster Presented at SECO International Convention, February 2008

**A Graves' Diagnosis: Examination of Etiology and Pathology of Graves' Disease**

Presented at Resident Conference San Francisco VA, March 2008.

**Macular Degeneration: Advancements in Clinical Research**

Presented at Resident Forum, UC Berkeley School of Optometry, June 2008

**POSTERS  
PRESENTED**

**Bilateral Optic Nerve Swelling Associated with Maxillary Sinusitis**

Presented at American Academy of Optometry (AAO) Annual Meeting 2006

**An examination of a patient with Lipemia Retinalis**

Submitted and accepted for presentation at (SECO) 2008

**Ocular Ischemic Syndrome Secondary to Asymmetric Narrow Carotid Artery.**

Presented at American Academy of Optometry (AAO) Annual Meeting, October 2008

**REFERENCES**

Available upon request.