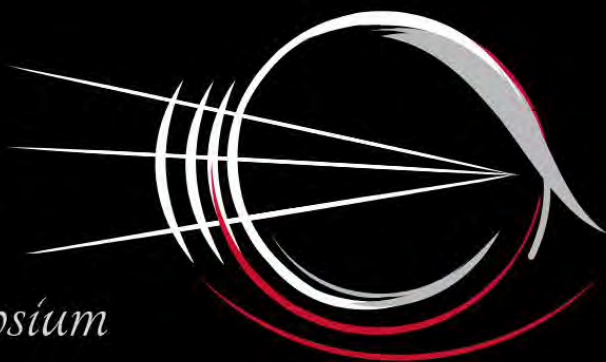


41st Annual

Cornea, Contact Lens
& Contemporary Vision Care

Symposium



Saturday Handouts

December 7-8, 2024

Houston, Texas

Conference Director
Anita Ticak, OD, MS, FAAO



College of Optometry
UNIVERSITY OF HOUSTON

41st Annual Cornea, Contact Lens & Contemporary Vision Care Symposium

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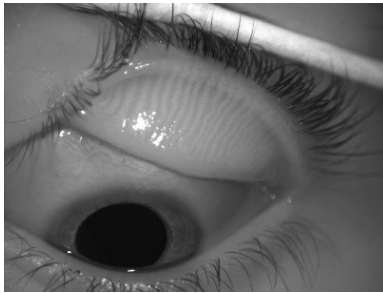
Program Location
University of Houston College of Optometry Health 1 Building
4401 Martin Luther King Blvd, Houston, Texas 77204

Saturday, December 7, 2024

7:00 am - 8:00 am	Check-In, Continental Breakfast, & Exhibit Hall		
8:00 am - 8:05 am	Announcements & CE Credit Overview		
Ocular Surface Disease Session			
Moderator: Anita Ticak, OD, MS, FAAO			
8:05 am - 9:45 am	Diagnosing and Treating Meibomian Gland Dysfunction in Contact Lens Wearers <i>Andrew Pucker, OD</i>	2 D/T Hours	COPE ID # 95312-TD
9:45 am - 10:15 am	Break & Exhibit Hall		
10:15 am - 11:05 am	Dry Eye Practice – Common Management Myths: What Does the Evidence Say? <i>Lucy Kehinde Darnell, OD, PhD, FAAO & Antoinette Antwi, OD</i>	1 D/T Hour	COPE ID # 95278-TD
11:05 am - 11:55 am	Current Trends: Treating Dry Eye Disease in Wavelengths <i>Anita Ticak, OD, MS & Antoinette Antwi, OD</i>	1 D/T Hour	COPE ID # 95279-TD
11:55 am - 12:00 pm	Wrap Up <i>Anita Ticak, OD, MS, FAAO</i>		
12:00 pm - 1:00 pm	Lunch & Exhibit Hall		
Contact Lens Session			
Moderator: Anita Ticak, OD, MS, FAAO			
1:00 pm - 1:50 pm	Contact Lens Updates <i>Biviana Lie, OD & Jean Thomson, OD</i>	1 D/T Hour	COPE ID # 95199-CL
1:50 pm - 2:40 pm	Prescribing Gas Permeable Corneal Lenses <i>Clarke Newman, OD, FAAO</i>	1 D/T Hour	COPE ID # 95281-CL
2:40 pm - 3:10 pm	Break & Exhibit Hall		
3:10 pm - 4:00 pm	Under the Lens: A Fresh Look at the Past, Present, and Future of Keratoconus <i>Karen DeLoss, OD, FAAO</i>	1 D/T Hour	COPE ID # 95283-TD
4:00 pm - 4:50 pm	Making Specialty Contact Lens Billing Work <i>Clarke Newman, OD, FAAO</i>	1 Gen Hour	COPE ID # 95282-PM
4:50 pm - 5:00 pm	Top Takeaways from Each Lecture <i>Anita Ticak, OD, MS, FAAO</i>		

Diagnosing and Treating MGD in Contact Lens Wearers

Andrew D. Pucker, OD, PhD, FAAO Diplomate, FSLs, FBCLA



Healthy?



Damaged?

1

Learning Objectives


- Understand the epidemiology of dry eye disease (DED)
- Understand how MGD is related to DED and contact lens (CL) discomfort
- Understand the key tests for evaluating MGD
- Understand a series of key studies that have evaluated the impact of CL use on meibomian gland structure and function
- Understand the potential for meibomian gland regeneration
- Understand the top treatment options for CL wearers with MGD

2

Commercial Disclosures

- Dr. Pucker has received support from Alcon Research, LLC (Research, Consulting), Art Optical (Research), CooperVision (Consulting), Haymark (Writing), Kala (Consulting), Nevakar, Inc (Consulting), Optikal Care Inc (Consulting) over the past 3 years.
- Dr. Pucker is currently an employee of Lexitas Pharma Services; however, he still holds an adjunct position at the University of Alabama at Birmingham. Lexitas Pharma Services is a Contract Research Organization, which does not make or market its own drugs or devices.
- All relevant financial relationships have been mitigated.

3




ELSEVIER

Contents lists available at [ScienceDirect](#)

The Ocular Surface

journal homepage: www.theocularsurface.com



TFOS DEWS II Report Executive Summary

“Dry eye is a multifactorial disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiological roles.”

2017

4

CLINICAL SCIENCES

Contents lists available at ScienceDirect
The Ocular Surface
 Journal homepage: www.elsevier.com/locate/jos

ELSEVIER

TFOS DEWS II Epidemiology Report

Fiona Stapleton, MCOptom, PhD^{a,1,*}, Monica Alves, MD, PhD^b, Vantine Y. Bunya, MD^c,
 Isabelle Jalbert, OD, PhD^d, Kaivalin Lekhanont, MD^e, Florence Malet, MD^f,
 Kyung-Sun Na, MD, PhD^g, Debra Schaumberg, ScD, OD^{h,i}, Miki Uchino, MD, PhD^j,
 Jelle Vehof, MD, PhD^{k,l}, Eloy Viso, MD, PhD^m, Susan Vitale, PhD, MHSⁿ,
 Lyndon Jones, FCOptom, PhD^o

The Lack of Association Between Signs and Symptoms in Patients With Dry Eye Disease

Kelly K. Nichols, OD, MPH, PhD, Jason J. Nichols, OD, MS MPH, and G. Lynn Mitchell, MAS

- Prevalence of dry eye disease ranges between 5% and 50% depending upon how the condition is defined.
- Signs and symptoms are often not correlated, which makes diagnosis challenging.
- Dry eye disease prevalence increases with age and is more likely in female patients.

5



Dry Eye Symptoms

- Dry eye is a symptoms-based disease that frequently drives patients to seek medical care
- Research studies typically require subjects to have both signs and symptoms as inclusion criteria
- Dry eye symptoms have historically been evaluated by simply asking subjects if they have dry eye symptoms

6

Common Dry Eye Symptoms

Symptom	McCarty et al. 1998 (n = 926)	Nichols et al. 1999 (n = 45)	Williamson et al. 2014 (n = 100)	Begley et al. 2002 (n = 687)
Ocular Discomfort (%)	32.1	N/R	N/R	64
Foreign Body Sensations (%)	25.7	N/R	30.3	12
Itching (%)	40.0	44.7 ± 26.8	4.0	55
Tearing (%)	34.5	N/R	17.2	N/A
Dryness (%)	17.0	57.2 ± 21.1	N/R	46
Photophobia (%)	50.4	5.0 ± 28.5	N/R	53
Soreness (%)	N/R	48.4 ± 22.0	N/R	49
Burning (%)	N/R	37.0 ± 24.8	46.5	39
Blur (%)	N/R	36.6 ± 21.6	N/R	57
Gritty or Scratchy (%)	N/R	N/R	N/R	41

*Nichols et al. 1999 used a visual analog scale to record frequency of symptoms; N/R = Not reported.

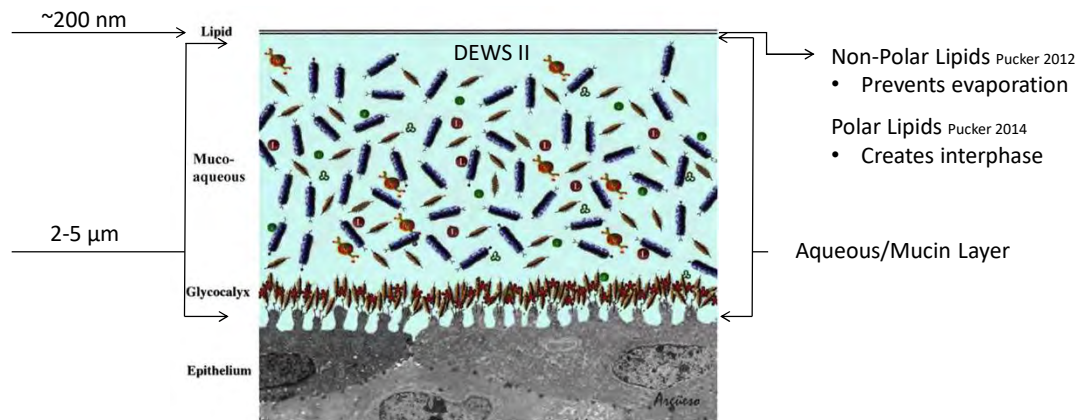
7

Two Primary Forms of Dry Eye

- Aqueous deficient dry eye
 - Typically, lacrimal gland deficiency, which results in decreased tear production
- Evaporative dry eye
 - Typically, MGD, which results in decreased tear volume from evaporation
- Evaporative dry eye is 3-6x more prevalent than aqueous deficient Lemp 2012
- Both forms can simultaneously exist Lemp 2012

8

The Tear Film Has Two Layers



9

Meibum Lipids

Lipid	Polarity	log P	Amount
Free Fatty Acids	Nonpolar	0.09-14.55	0.0-10.4% ^{1,5,9,13-18}
Wax Esters	Nonpolar	12.41	25.0-68.0% ^{1,10,12,13,63,77}
Cholesterol Esters	Nonpolar	12.38	0.0-65.0% ^{1,5,14,16,19,20,64,80}
Diesters	Nonpolar	12.40	2.3-17.6% ^{1,16,18,80}
Free sterols	Nonpolar	6.73	Trace-30.0% ^{1,13,15,16,18,21,80,81}
Monoglycerides	Nonpolar	4.28	Trace-2.6% ^{6,9,13}
Diglycerides	Nonpolar	9.37	Trace-3.3% ^{6,9,13}
Triglycerides	Nonpolar	14.46	Trace-9.0% ^{1,6,9,13-16,18,21,64,80}
Hydrocarbons	Nonpolar	9.47	Trace-7.5% ^{1,9,13,14,23,75}
Phospholipids	Polar	5.29	0.0-14.8% ^{1,14,24,64}
Sphingolipids	Polar	9.12	Unknown ^{14,25,26}
Hydroxy Fatty Acids	Polar	4.32	Trace-3.5% ^{5,27,28,64,80}

Pucker 2012

10



Cochrane Database of Systematic Reviews

Over the counter (OTC) artificial tear drops for dry eye syndrome (Review)

Pucker AD, Ng SM, Nichols JJ

- Tear complexity makes it unlikely that we could replicate the tears with a drop
- Strategically incorporating tear lipids may help

2016

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Special Issue

The International Workshop on Meibomian Gland Dysfunction: Executive Summary

Kelly K. Nichols,¹ Gary N. Foulks,² Anthony J. Bron,³ Ben J. Glasgow,^{4,5} Murat Dogru,⁶ Kazuo Tsubota,⁶ Michael A. Lemp,⁷ and David A. Sullivan^{8,9}

MGD is “a chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative/quantitative changes in glandular secretion. It may result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease.”

2011

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Special Issue

The International Workshop on Meibomian Gland Dysfunction: Report of the Subcommittee on the Epidemiology of, and Associated Risk Factors for, MGD

Debra A. Schaumberg,¹ Jason J. Nichols,² Eric B. Papas,³ Louis Tong,⁴ Miki Uchino,⁵ and Kelly K. Nichols²

TABLE 1. Population-Based Studies Providing Estimates of the Prevalence of MGD

Study	Participants	Ethnicity	Parameter	Prevalence	Age (y)	Reference
Bangkok Study*	550	Thai (various)	Telangiectasia or meibomian gland plugging or collarettes	46.2% (95% CI, 42-51)	>40	Lekhanont et al. ²⁷
Beijing Eye Study	1957	Mainland Chinese	Telangiectasia (asymptomatic) Telangiectasia (symptomatic for dry eye)	68.0% (95% CI, 65.6-70.4) 69.3% (95% CI, 64.5-73.8)	>40	Jie et al. ³⁰
Japanese study	113	Japanese	Gland dropout, expressibility and nature of meibum secretion	61.9% (95% CI, 52.1-70.9)	>60	Uchino et al. ²⁹
Shihpai Eye Study	1361	Taiwanese Chinese	Telangiectasia or meibomian gland orifice plugging	60.8% (95% CI, 59.5-62.1)	>65	Lin et al. ²⁸
Melbourne Visual Impairment Project	926	Caucasian	Tear break up time < 1 SD (10 s) Tear break up time < 1.5 SD (8 s)	19.9% (95% CI, 17.4-22.7) 8.6% (95% CI, 6.9-10.7)	40-97	McCarty et al. ³¹
Salisbury Eye Evaluation	2482	Caucasian	Meibomian gland plugging or collarettes (clinical grades 2, 3)	3.5% (95% CI, 2.8-4.4)	>65	Schein et al. ²⁰

3.5% to 69.3%

- MGD is likely more common in patients of Asian decent, though age relationship is unclear because of study designs

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Meibomian (Tarsal) Gland Anatomy

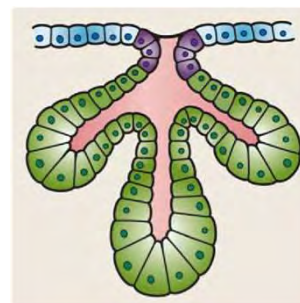
Location: Upper and lower eyelids Andrews 1973

Number: 30-40 upper, 20-30 lower Andrews 1973

Structure: Simple branched acinar Jester 1981

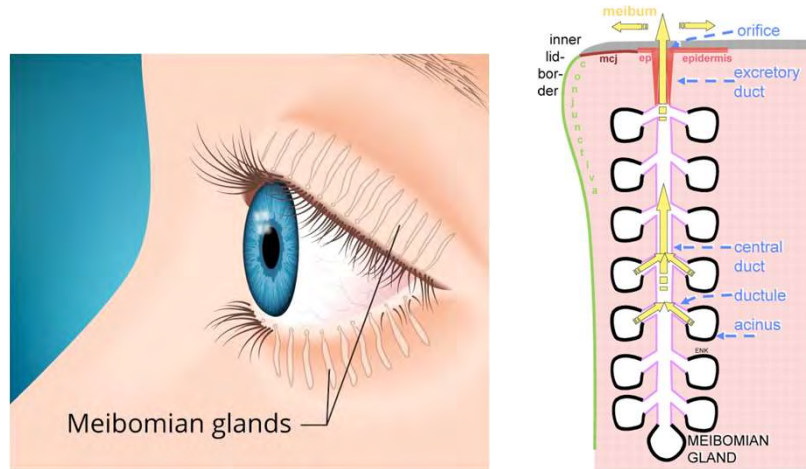
Expression Type: Holocrine Jester 1981

Products: Primarily lipids and a few proteins Pucker 2012; Pucker 2014



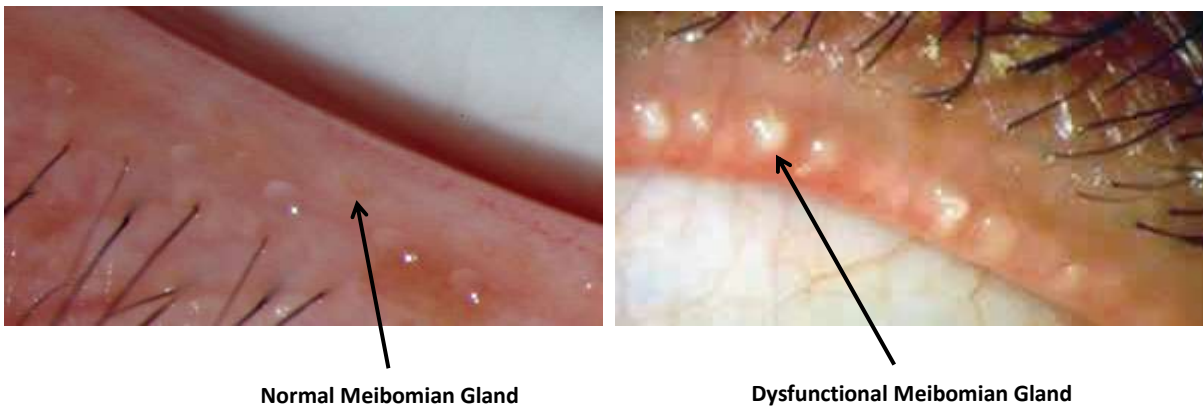
14

Meibomian Gland Anatomy



15

Meibomian Glands



16

Meibomian Glands



Anna A. Tichenor, OD, PhD, FAAO

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The Lipid Layer is Important

- Disruption of the tear lipid layer correlates with increased evaporation and dry eye Foulks 2007; Craig 1997; Goto 2003
- Evaporation likely leads to an increased tear osmolarity and inflammation Foulks 2007; King-Smith 2008; Rashid 2008
- Ocular surface signs and symptoms associated with a poor tear lipid layer Foulks 2007; Shimazaki 1995
- Meibomian gland atrophy associated with decreased lipid production Jester 2011

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Implementing a Standardized Exam

- Testing protocol should allow for differentiation between evaporative and aqueous deficient dry eye
- A balance must be struck between number of tests and the amount of information needed to make an informed diagnosis

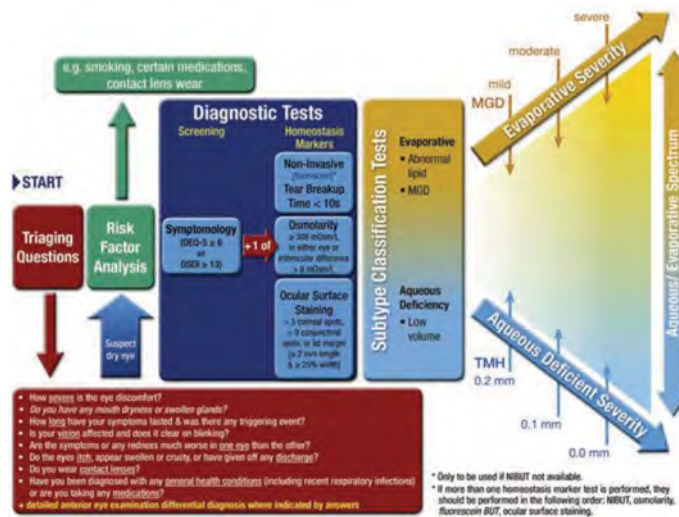


Exam standardization results in better patient care (Bron 2003)

- Allows for better continuity of care
- Allows for disease severity tracking
- Helps ensure for a complete exam

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DEWS II Diagnosis Plan



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Ocular Surface Disease Index® (OSDI®)

Add your answers to the following 12 questions, and enter the number in the box that best represents your answer. Then, fill in boxes A, B, C, D, and E according to the instructions below each.

How are your eyes at the end of the day?	All the time	Most of the time	Some of the time	Some of the time	None of the time
1. Eyes are watery or gritty?	4	3	2	1	0
2. Eyes are itchy?	4	3	2	1	0
3. Flakes or sore eyes?	4	3	2	1	0
4. Blurred vision?	4	3	2	1	0
5. Poor vision?	4	3	2	1	0

Subtotal score for answers 1 to 5:

How often do you have problems with your eyes when you are performing your job or working outside the last week?	All the time	Most of the time	Some of the time	Some of the time	None of the time
6. Working?	4	3	2	1	0
7. Driving a car?	4	3	2	1	0
8. Working with a computer or using a video display?	4	3	2	1	0
9. Watching TV?	4	3	2	1	0

Subtotal score for answers 6 to 9:

How often do you feel uncomfortable or irritated when you are performing your job or working outside the last week?	All the time	Most of the time	Some of the time	Some of the time	None of the time
10. Working?	4	3	2	1	0
11. Driving a car?	4	3	2	1	0
12. Working with a computer or using a video display?	4	3	2	1	0
13. Watching TV?	4	3	2	1	0

Subtotal score for answers 10 to 13:

Add subtotals A, B, and C to obtain D (D = sum of scores for all questions answered)

Total number of questions answered (do not include questions answered N/A)

Please turn over the questionnaire to calculate the patient's final OSDI score.

DRY EYE QUESTIONNAIRE (DEQ-5)

Name: _____

1. Questions about **EYE DISCOMFORT**:

a. During a typical day in the past month, how often did your eyes feel discomfort?

NEVER	BARELY	SOMETIMES	FREQUENTLY	CONSTANTLY
0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>

b. When your eyes feel discomfort, how intense was this feeling of discomfort at the end of the day within two hours of going to bed?

NEVER HAVE IT	NOT INTENSE AT ALL				VERY INTENSE
0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

2. Questions about **EYE DRYNESS**:

a. During a typical day in the past month, how often did your eyes feel dry?

NEVER	BARELY	SOMETIMES	FREQUENTLY	CONSTANTLY
0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>

b. When your eyes feel dry, how intense was this feeling of dryness at the end of the day within two hours of going to bed?

NEVER HAVE IT	NOT INTENSE AT ALL				VERY INTENSE
0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

3. Questions about **WATERY EYES**:

a. During a typical day in the past month, how often do your eyes water freely, unnecessarily, or wobble?

NEVER	BARELY	SOMETIMES	FREQUENTLY	CONSTANTLY
0 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>

Score

14	0	10	0	24	0	26	0	3	0	TOTAL
										0

0-100 Scale
Suggested by DEWS II
0-22 Scale

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CONTACT LENS QUESTIONNAIRE-4 (CLDEQ-4)

1. Questions about **EYE DISCOMFORT**:

a. During a typical day in the past 2 weeks, how often did your eyes feel discomfort while wearing your contact lenses?

0 = Never
1 = Rarely
2 = Sometimes
3 = Frequently
4 = Constantly

When your eyes felt discomfort with your contact lenses, how intense was this feeling of discomfort...

b. At the end of your wearing time?

Never Not at All Very Intense
0 1 2 3 4 5

2. Questions about **EYE DRYNESS**:

a. During a typical day in the past 2 weeks, how often did your eyes feel dry?

0 = Never
1 = Rarely
2 = Sometimes
3 = Frequently
4 = Constantly

When your eyes felt dry, how intense was this feeling of dryness...

b. At the end of your wearing time?

Never Not at All Very Intense
0 1 2 3 4 5

Copyright: Farnam of Indiana University, 2009, all rights reserved

Patient/Subject #: _____
Date: ___/___/___ Time: _____

SPEED™ QUESTIONNAIRE

Name: _____ Date: ___/___/___ Sex: M F (Circle) DOB: ___/___/___

For the Standardized Patient Evaluation of Eye Dryness (SPEED) Questionnaire, please answer the following questions by checking the box that best represents your answer. Select only one answer per question.

1. Report the type of **SYMPTOMS** you experience and when they occur:

Symptoms	At this visit		Within past 72 hours		Within past 3 months	
	Yes	No	Yes	No	Yes	No
Dryness, Grittiness or Scratchiness						
Burnness or Irritation						
Blurring or Wobbling						
Eye Fatigue						

2. Report the **FREQUENCY** of your symptoms using the rating list below:

Symptoms	0	1	2	3
Dryness, Grittiness or Scratchiness				
Burnness or Irritation				
Blurring or Wobbling				
Eye Fatigue				

0 = Never 1 = Sometimes 2 = Often 3 = Constant

3. Report the **SEVERITY** of your symptoms using the rating list below:

Symptoms	0	1	2	3	4
Dryness, Grittiness or Scratchiness					
Burnness or Irritation					
Blurring or Wobbling					
Eye Fatigue					

0 = No Problems
1 = Troublesome - sometimes, but not uncomfortable
2 = Uncomfortable - irritating, but does not interfere with my day
3 = Discomforting - irritating and interferes with my day
4 = Intolerable - unable to perform my daily tasks

4. Do you use eye drops for lubrication? YES NO If yes, how often? _____

©2010 Farnam of Indiana University, Inc. All rights reserved. For office use only. Total SPEED score (Frequency + Severity) = ____/28

>=12 = Benefit from CL Change
0-35 Scale
0-28 Scale

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SANDE Questionnaire

PLEASE COMPLETE THE FOLLOWING QUESTIONS REGARDING THE FREQUENCY AND SEVERITY OF YOUR DRY EYE SYMPTOMS.

1. Frequency of symptoms:
Please place an 'X' on the line to indicate how often, on average, your eyes feel dry and/or irritated:

Rarely _____ All the time

2. Severity of symptoms:
Please place an 'X' on the line to indicate how severe, on average, you feel your symptoms of dryness and/or irritation:

Very Mild _____ Very Severe


© 2000 Massachusetts Eye and Ear Infirmary

0-100 Scale

Eye Dryness Scale

Eye Dryness

0 100



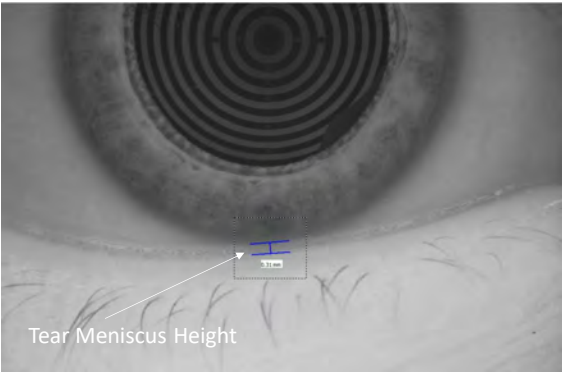
0 = No Symptoms; 100 Severe Symptoms

≥40 criteria for Dry Eye

0-100 Scale

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Tear Volume



Tear Meniscus Height

Meniscus Height

Normal ≥ 0.20 mm

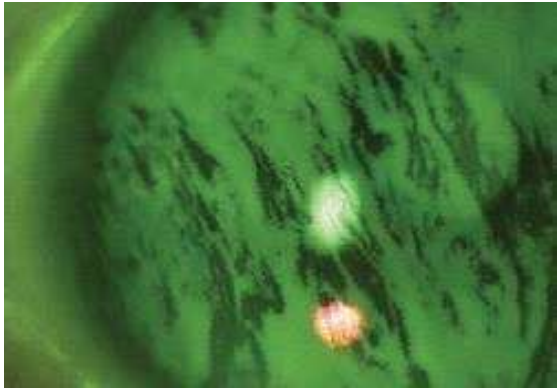


Schirmer's Test (5 minutes)

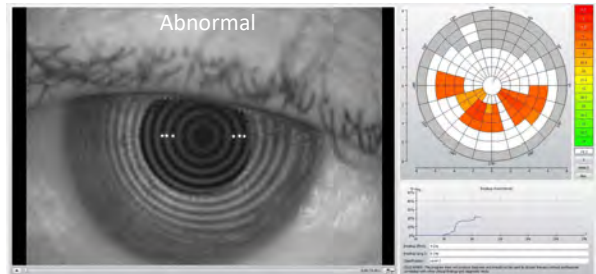
Normal ≥ 10.0 mm

24

Tear Break Up Time (TBUT)



Invasive Tear Break Up Time



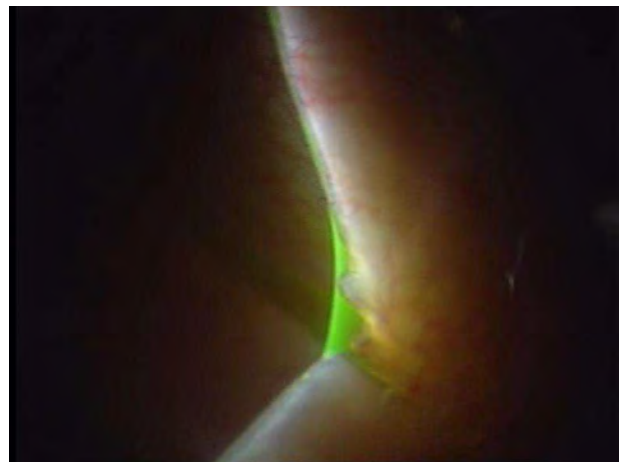
Non-Invasive Tear Break Up Time

Normal \geq 10 Seconds

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Lid Parallel Conjunctival Folds (LIPCOF)

- LIPCOF are about 0.08 mm high while microfolds are about 0.01 mm high.
- LIPCOF likely displace the tears, which may decrease tear turnover and drainage, and LIPCOF may physically prevent the eyelid from fully closing.
- Condition may result from increased friction from dryness.
- True LIPCOF reform after manipulating the eyelid.



Dr. Wolfgang Sickenberger

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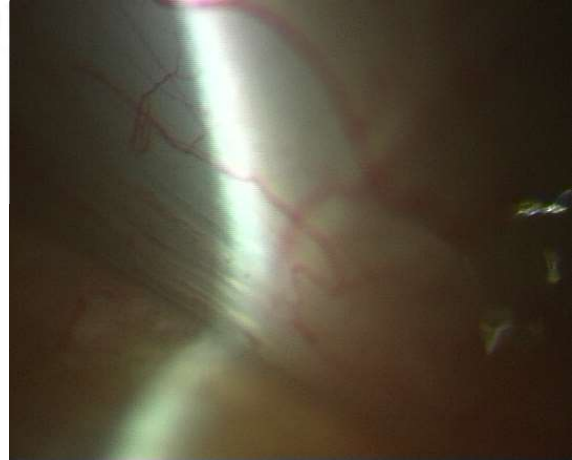
Diagnostic in CL Wearers

ORIGINAL ARTICLE

A Novel Method to Predict the Dry Eye Symptoms in New Contact Lens Wearers

Heiko Pult*, Paul J. Murphy*, and Christine Purslow†

- Temporal LIPCOF (0.76), nasal LIPCOF (0.73), and LIPCOF Sum (0.81) showed acceptable to excellent discrimination for for predicting CL-induced dry eye (CLIDE) before CL fitting.



Sickenberger W, Pult H, Sickenberger B. LIPCOF and contact lens wearers - a new tool of forecast subjective dryness and degree of comfort of contact lens wearers. *Contactologia* 2000;22:74-79

Dr. Wolfgang Sickenberger

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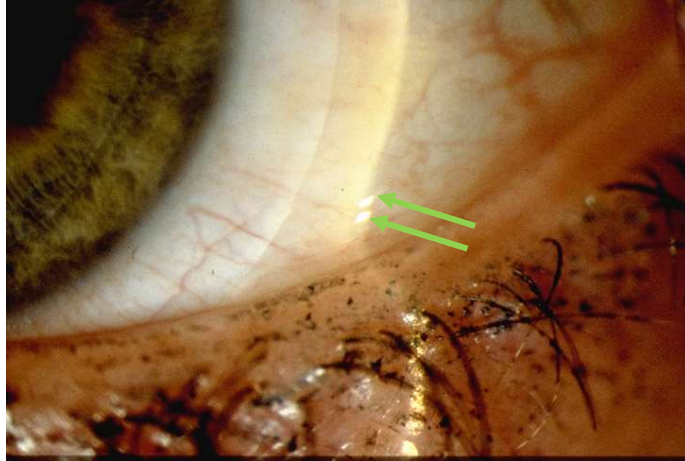
Optimized Lid Parallel Conjunctival Folds (LIPCOF) Grading Scale

Scale	Description			
Grade	0	1	2	3
Description	No conjunctival folds or disrupted microfolds in one line	One permanent and clear parallel fold or one permanent and clear parallel fold plus disrupted microfolds	Two permanent and clear parallel folds (normally lower than 0.2 mm) or two permanent and clear parallel folds plus disrupted micro-folds above	More than two permanent and clear parallel folds (normally higher than 0.2 mm) or more than two permanent and clear parallel folds plus disrupted micro-folds above

- An abnormal sum grade (nasal + temporal) is 2 or more with sensitivity and specificity 83.6% and 54.8%.

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Lid Parallel Conjunctival Folds (LIPCOF)



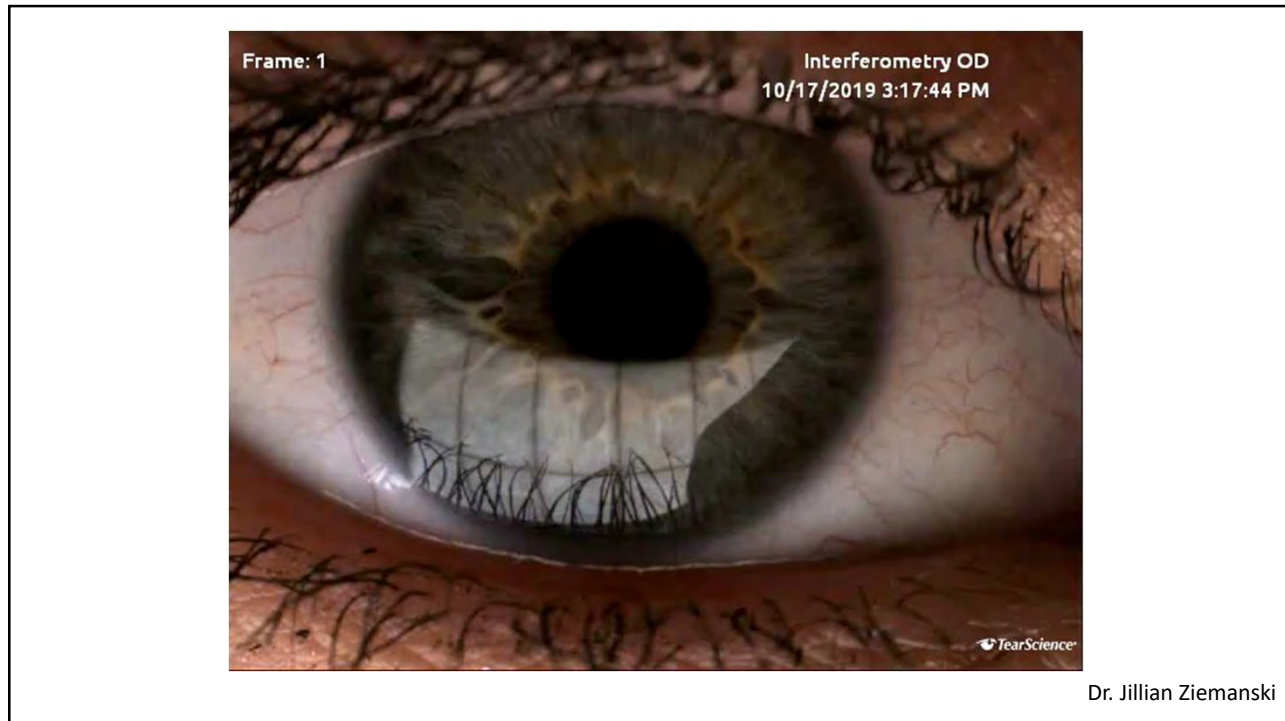
Dr. Wolfgang Sickenberger

29

Lipid Layer Thickness

- The LipiView is an interferometry-based instrument, which is a complex technology that has proven useful for characterizing tear film characteristics in the laboratory setting
- Patient is seated at the machine, their eye is centered, and their tear film is imaged for 20 seconds while they blink normally
- Lipid layer thickness is automatically calculated
- 74% of the patients with severe dry eye symptoms had lipid layer thicknesses ≤ 60 nm while 72% of subjects with no dry eye symptoms had lipid layer thicknesses ≥ 75 nm


30



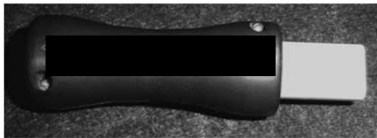
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Meibomian Gland Expression

Finger Expression



Meibomian Gland Evaluator



Normal = 0


Trace = 1

Mild = 2

Moderate = 3

Severe = 4

MEIBOMIAN GLAND DYSFUNCTION



Efron

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Meibum Quality Grading Scales

Scale	Grade Description				
Grade	0	1	2	3	4
Bron et al. 1991	Clear (Normal)	Cloudy	Granular	Inspissated/Solid	N/A
Mathers et al. 1991	N/A	Clear	Relatively Clear	Opaque with Normal Viscosity	Toothpaste Like
Shimazaki et al. 1998	Clear Meibum/Easily Expressed	Cloudy Meibum/ Mild Pressure	Cloudy Meibum/ Moderate Pressure	Meibum Not Expressible/Hard Pressure	N/A
Meadows et al. 2012	Clear (Normal)	Granular Meibum	Whitish Semisolid Meibum	Yellow Solid Meibum	No Meibum Expressed

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MG Expressibility Grading Scales

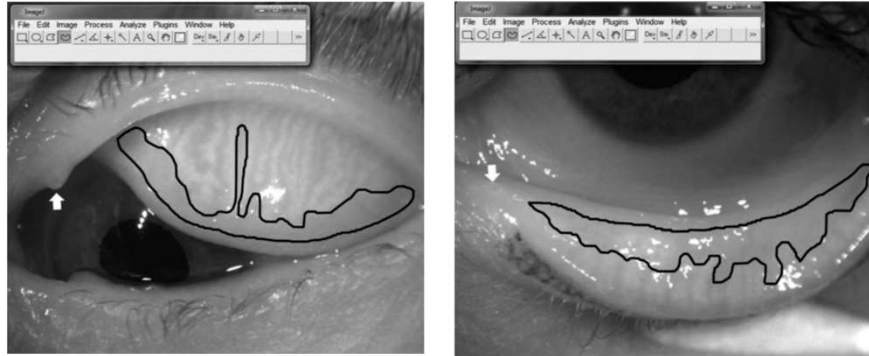
Scale	Grade Description			
Grade	0	1	2	3
Bron et al. 1991	All Expressed	1-2 Plugged	3-4 Plugged	5+ Plugged
Pflugfelder 1998 (5 Lower Glands)	All Expressed	3-4 Expressed	1-2 Expressed	None
Foulks and Bron 2003	Minimal Pressure	Light Pressure	Moderate Pressure	Heavy Pressure
Meadows et al. 2012 (Central 8 Glands)	≥4 Expressed (Normal)	3 Expressed (Mild)	2 Expressed (Moderate)	≤1 Expressed (Severe)

Combined Grade = Quality Grade for each Expressible Gland

34

Meibomian Gland Atrophy

- **Definition:** a decreased volume of cells after normal development Obata 2002
- **Analysis Methods:** contact and non-contact meibography Wise 2012

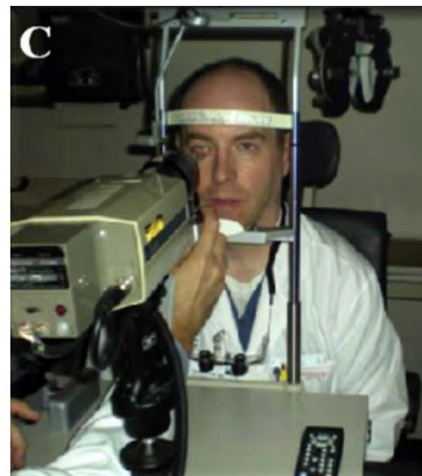


35

Contact Meibography



Transillumination Probe - White Light
Wise 2012



Infrared Camera Wise 2012

36

Non-Contact (Modern) Meibography



BG-4M

IR Transmitting Light Filter with IR Camera



Keratograph 5M

IR Light Source with IR Camera

37

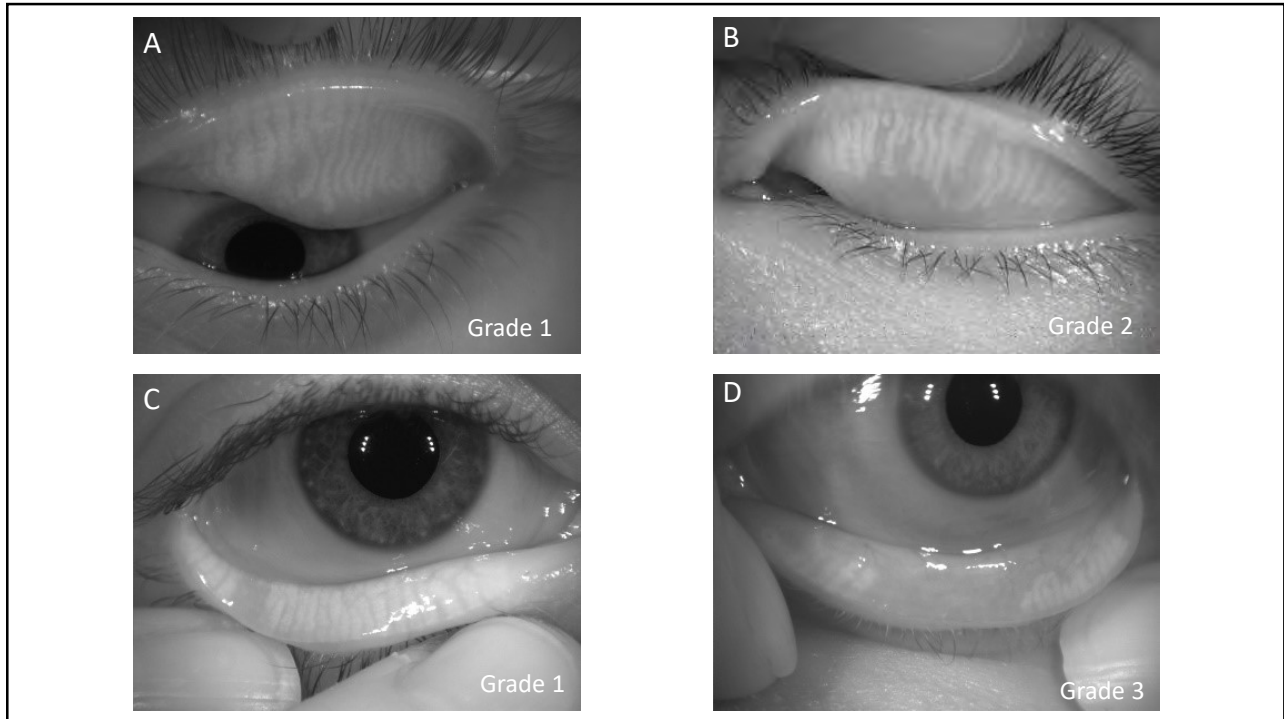
MG Atrophy Grading Scale

Scale	Description					
	Grade	0	1	2	3	4
Shimazaki et al. 1998 (%)	None	<50	>51	N/A	N/A	
Pflugfelder et al. 1998 (%)	None	1 to ≤33	34-66	≥67	N/A	
Nichols et al. 2005 (%)	N/A	None	<25	25-75	>75	
Arita et al. 2008 (%)	None	1 to <33	33 to 67	>67	N/A	
Pult and Pult 2013 (%)	None	<25	26-50	51-75	>75	

- Grade 0 and 1 are likely normal scores since most patients have a little atrophy

Pucker & Tichenor 2021


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MG Tortuosity

- Meibomian gland tortuosity is deviation from a normal straight gland course within tarsal plate

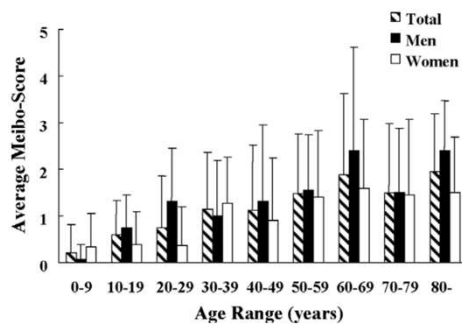


A close-up photograph of the eyelid showing the Meibomian glands. The glands are visible as a series of parallel lines, but they exhibit a significant deviation from their normal straight course, illustrating Meibomian gland tortuosity.

40

Noncontact Infrared Meibography to Document Age-Related Changes of the Meibomian Glands in a Normal Population

Reiko Arita, MD, PhD,^{1,2} Kouzo Itoh, MD, PhD,¹ Kenji Inoue, MD, PhD,³ Shiro Amano, MD, PhD²



- Cross-sectional study of 236 healthy patients
- First study to use non-contact meibography in large clinical population
- Meibomian gland atrophy significantly increases with age

2008

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Relation Between Upper and Lower Lids' Meibomian Gland Morphology, Tear Film, and Dry Eye

Heiko Pult*, Britta H. Riede-Pult†, and Jason J. Nichols‡

- Understand upper and lower eyelid atrophy differences and their relationship to symptoms (n = 20).
- Atrophy was greater in lower eyelid.
- Atrophy was related to symptoms (OSDI) and thinner lipid layers.

42

Six-Month Effects of a Thermodynamic Treatment for MGD and Implications of Meibomian Gland Atrophy

David Finis, MD, Claudia König, MS, Jasmin Hayajneh, MS, Maria Borrelli, MD, PhD, Stefan Schrader, MD, PhD, and Gerd Geerling, MD

- Understand regional meibomian gland atrophy and how atrophy is related to gland function (n = 128).
- Upper eyelids had even atrophy distribution with lower eyelids had greater atrophy nasally.
- Greater atrophy resulted in decreased gland expression.

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Do contact lenses impact MG health?



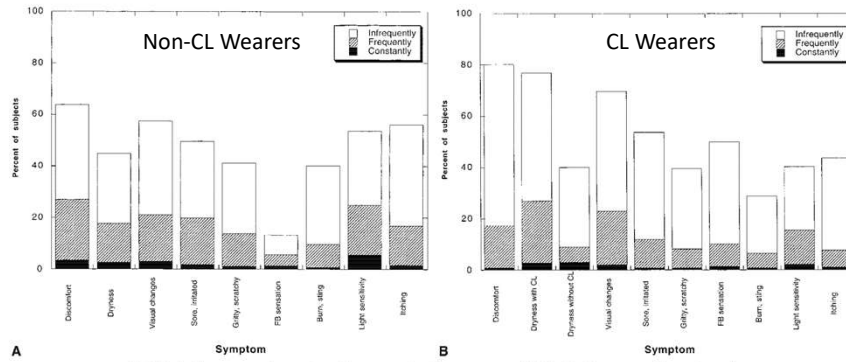
Theories

- Mechanical impact from eyelid moving over CL could cause gland atrophy
- CL could alter tear structure and clog meibomian glands leading to atrophy
- CL could induce ocular surface inflammation resulting in gland atrophy

44

Characterization of Ocular Surface Symptoms From Optometric Practices in North America

Carolyn G. Begley, O.D., M.S., Robin L. Chalmers, O.D.,



- Survey (n = 1,054 unselected subjects) found 64% of non-CL wearers and 79% of CL wearers experienced at least some ocular discomfort.

45

U.S. Access Full Text Article

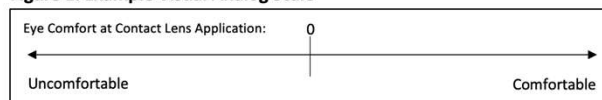
CLINICAL TRIAL REPORT

Real-Time Ocular Comfort Reporting in Monthly Replacement Contact Lens Wearers

Terri Call^{1*}, Andrew D Pucker^{1*}, Gerald McGwin Jr², Quentin X Franklin¹, Amy Logan¹

- Determined that while CL wearers were slightly less comfortable at the end of the day compared to application, this comfort change was minimal given that the average participants had overwhelmingly good comfort at all time- points evaluated. Comfort scores were likewise consistent across 1 month of wear.

Figure 1: Example Visual Analog Scale



• Mean initial CL comfort at first application of the Total30 CLs was 45.56 ± 9.20.

Day of Wear	Hours of Wear (Mean ± SD)
Day 1	15.72 ± 1.31
Day 2	15.46 ± 0.98
Day 3	15.31 ± 1.27
Day 4	14.80 ± 2.41
Day 5	15.47 ± 1.32
2 Weeks	15.55 ± 1.44
1 Month	15.33 ± 2.18
P-Value	0.77

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Meibomian gland dysfunction and contact lens intolerance

1980

DONALD R. KORB, O.D.
ANTONIO S. HENRIQUEZ, M.D., PH.D

TABLE II
PREVALENCE OF SECRETION RELEASE BY
MEIBOMIAN GLANDS AS A RESULT OF GENTLE EXPRESSION

	All expressed glands released secretion	No expressed glands released secretion	Some expressed glands released secretion
38 symptomatic subjects (71 eyes)	7 (9.9%)	26 (36.6%)	38 (53.5%)
40 control subjects (80 eyes)	46 (57.5%)	2 (2.5%)	32 (40.0%)

TABLE III
PREVALENCE OF SECRETION RELEASE BY
MEIBOMIAN GLANDS AS A RESULT OF FORCEFUL EXPRESSION

	All expressed glands released secretion	No expressed glands released secretion	Some expressed glands released secretion
34 symptomatic subjects (64 eyes)	13 (20.3%)	19 (29.7%)	32 (50.0%)
29 control subjects (58 eyes)	44 (75.8%)	1 (1.7%)	13 (22.4%)

- CL intolerant subjects were compared to asymptomatic CLs wearers with the authors finding that the CL intolerant subjects were significantly more likely to have MGD than the asymptomatic CLs wearers.

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review

CCLRU Standards for Success of Daily and Extended Wear Contact Lenses

ROBERT L. TERRY,* CRISTINA M. SCHNIDER,† BRIEN A. HOLDEN,‡ RUTH CORNISH,§
TIM GRANT,¶ DEBORAH SWEENEY,‡ DONNA LA HOOD,¶ and ARTHUR BACK¶
Cornea and Contact Lens Research Unit, School of Optometry, University of New South Wales, Sydney, Australia

- Daily wear CL wearers should be able to comfortably wear their CLs for >12 hours/day for 6 or more days/week

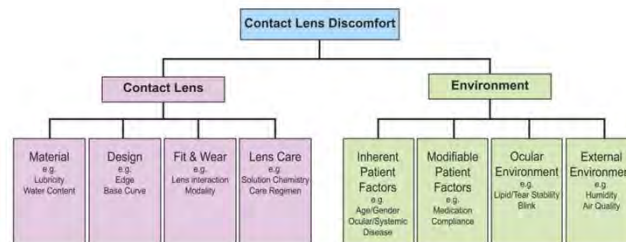
1992

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Special Issue

The TFOS International Workshop on Contact Lens Discomfort: Executive Summary

“Contact lens discomfort is a condition characterized by episodic or persistent adverse ocular sensations related to lens wear, either with or without visual disturbance, resulting from reduced compatibility between the contact lens and the ocular environment, which can lead to decreased wearing time and discontinuation of contact lens wear.”



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Special Issue

The TFOS International Workshop on Contact Lens Discomfort: Executive Summary

Progression of CLD



- True contact lens discomfort is alleviated by removing the contact lenses!

50

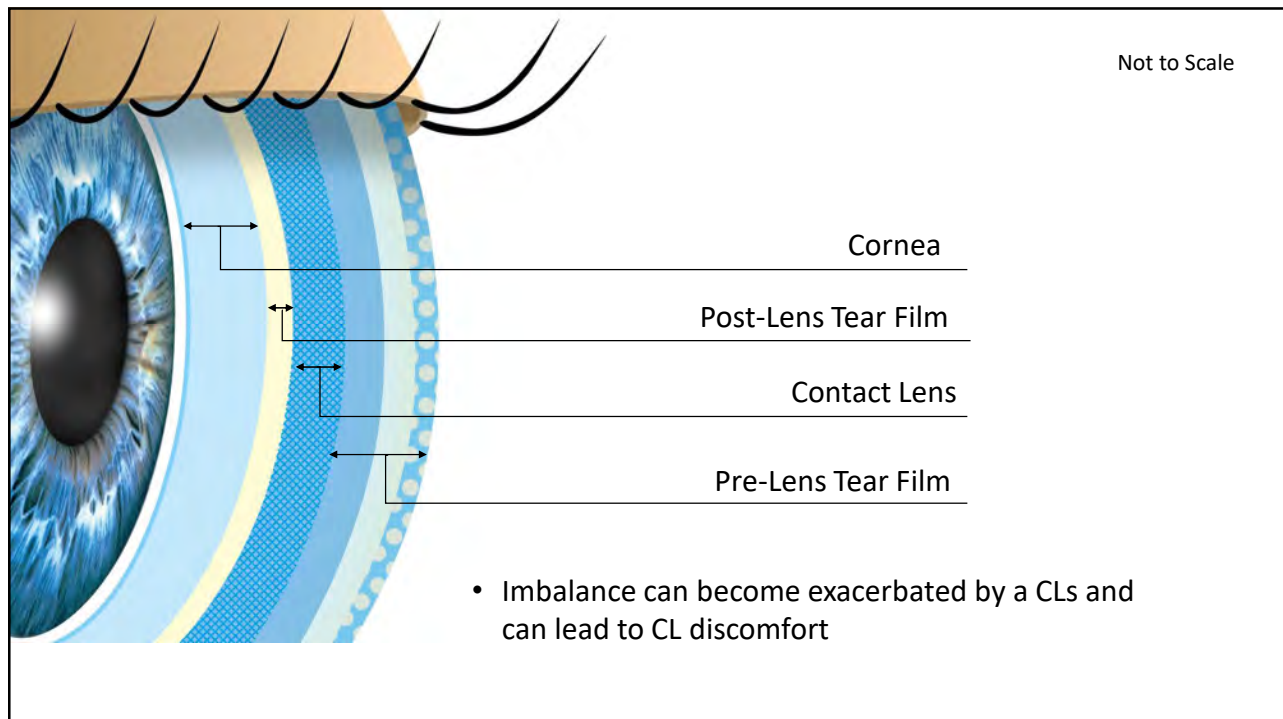
Discomfort is Bad for CLs!

Table 1 Summary of the Frequency of Contact Lens Dropout by Study and for All Studies

Study	Study Design	Neophyte/ Established Wearer	Number of Subjects (n)	Dropout Frequency	Top Dropout Reason
Weed et al 1993 ¹⁵	Canadian/Survey	Established	568	26.5%	Ocular Discomfort
Briggs 1996 ^{12-~}	Saudi Arabia/Survey	Established	200	N/A	Ocular Discomfort
Pritchard et al 1999 ⁹	Canadian/Survey	Established	1444	12%	Ocular Discomfort
Richdale et al 2007 ²⁵	United States/Survey	Established	730	24.1%	Ocular Symptoms
Rumpakis 2010 ¹¹	International/Survey	Unknown	372	15.9% United States 17.0% North America 31.0% Asia/Pacific Rim 30.4% Europe/Middle East/Africa	Ocular Discomfort
Dumbleton et al 2013 ¹⁰	Canadian/Survey	Established	4207	23%	Ocular Discomfort

Pucker & Tichenor 2020

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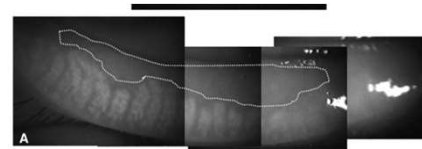
Contact Lens Wear Is Associated with Decrease of Meibomian Glands

Reiko Arita, MD, PhD,^{1,2} Kouzo Itoh, MD, PhD,¹ Kenji Inoue, MD, PhD,³ Aya Kuchiba, PhD,⁴ Takuhiro Yamaguchi, PhD,⁵ Shiro Amano, MD, PhD²

- Cross-sectional study of 121 CL (soft and GP) and 121 non-CL wearers

Table 1. Mean Meiboscores in Contact Lens Wearers and Nonwearers

	Mean Meiboscore (95% Confidence Interval)		
	Contact Lens Wearers	Nonwearers	P Value
Total	1.72 (1.47–1.96)	0.96 (0.73–1.19)	<0.0001
Upper eyelid	0.86 (0.71–1.01)	0.32 (0.24–0.40)	<0.0001
Lower eyelid	0.87 (0.68–1.05)	0.62 (0.48–0.76)	0.036



- Years of CL wear was associated with greater atrophy
- No difference between soft CL and GP CL wearers
- Atrophy noticed at distal end of gland

2009

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ORIGINAL ARTICLE

Associations with Meibomian Gland Atrophy in Daily Contact Lens Wearers

Andrew D. Pucker*, Lisa A. Jones-Jordan†, Wing Li‡, Justin T. Kwan‡, Meng C. Lin§, Wolfgang Sickenberger||, Sebastian Marx**, Sruthi Srinivasan††, and Lyndon W. Jones‡‡



- Determine how meibomian atrophy is related to contact lens use
- Determine factors associated with contact lens wear

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Study Design

- A cross-sectional, five-site study conducted between 2013 and 2014
- CL wearers (case) and age- and sex-matched non-CL wearers (control) were recruited for a single study visit
- All CL wearers were required to have consistently worn CLs for five or more days/week for at least five years
- CL wearers were required to have a valid CL prescription (<1-year-old)
- Control subjects were only eligible if they had never been prescribed CLs

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Inclusion/Exclusion Criteria

- Inclusion Criteria
 - >18 years of age with a completed eye exam within last year
- Exclusion Criteria
 - Ocular surgery within past year
 - Regular overnight CL use
 - Ocular trauma, scarring, or eyelid abnormalities
 - Active ocular infection or inflammation
 - Accutane or prescription eye medication use
 - Pregnant or breast feeding



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Testing Protocol

- No CL wear, makeup, or artificial tears were allowed at the visit Faber 1991
- Testing was performed in order of least to most invasive test Bron 2003
- All subjects complete the Ocular Surface Disease Inventory (OSDI) questionnaire
- Completed a comprehensive battery of dry eye tests

Ocular Surface Disease Index® (OSDI)[®]

Ask your patients the following 12 questions, and circle the number in the box that best represents each answer. Then fill in boxes A, B, C, D, and E according to the instructions beside each.

How often you experience any of the following (circle the best answer)?	All of the time	Most of the time	Half of the time	Some of the time	None of the time
1. Eyes that are sensitive to light?	A	B	C	D	E
2. Eyes that tear often?	A	B	C	D	E
3. Itching or sore eyes?	A	B	C	D	E
4. Blurred vision?	A	B	C	D	E
5. Poor vision?	A	B	C	D	E

Subtotal score for answers 1 to 5

How often you experience any of the following (circle the best answer)?	All of the time	Most of the time	Half of the time	Some of the time	None of the time
6. Reading?	A	B	C	D	E
7. Driving at night?	A	B	C	D	E
8. Reading with a computer or desk machine (OSDI)?	A	B	C	D	E
9. Reading TV?	A	B	C	D	E

Subtotal score for answers 6 to 9

How often you experience any of the following (circle the best answer)?	All of the time	Most of the time	Half of the time	Some of the time	None of the time
10. Worried about eyes?	A	B	C	D	E
11. Vision or eyes with the sun? (circle the best answer)?	A	B	C	D	E
12. Vision that are so uncomfortable?	A	B	C	D	E

Subtotal score for answers 10 to 12

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Subject Demographics



- 142 subjects (71 matched-pairs) recruited
 - Sample was 63% female
 - CL wearers were 30.6 years \pm 12.4
 - Non-CL wearers were 30.1 years \pm 12.2
 - 6.3% of subjects had dry eye

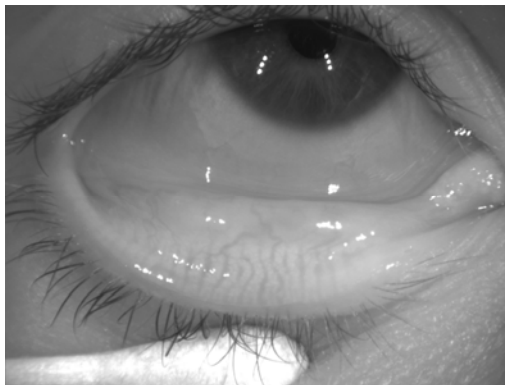
58

Summary statistics for procedures completed during ocular surface assessment (worst eye)

Procedure	CL wearers, mean \pm SD	NCL wearers, mean \pm SD	Difference (p)
OSDI (0–100 scale) ^{21,22}	9.2 \pm 11.5	7.8 \pm 12.2	0.72
TBUT, s ²⁰	11.3 \pm 6.6	9.5 \pm 5.5	0.08
TMH, mm	0.3 \pm 0.1	0.2 \pm 0.1	0.11
Bulbar redness, U	0.8 \pm 0.4	0.8 \pm 0.3	0.80
Limbal redness, U	0.5 \pm 0.3	0.5 \pm 0.3	0.20
Tear osmolarity, mOsm/L	301.5 \pm 10.7	304.2 \pm 13.4	0.13
Blepharitis (0–4 scale)	0.6 \pm 0.7	0.5 \pm 0.7	0.54
Eye lid margin erythema (0–3 scale) ²³	0.4 \pm 0.6	0.5 \pm 0.6	0.04
Lid parallel conjunctival folds (0–3 scale) ²⁴	1.3 \pm 0.9	1.0 \pm 0.8	0.06
Meibomian gland expressibility (0–3 scale) ²⁵	2.1 \pm 1.7	1.9 \pm 1.7	0.66
Meibum quality (0–3 scale) ²⁵	0.9 \pm 1.2	0.8 \pm 1.2	0.88
Area of sodium fluorescein corneal staining (0–20 scale) ²⁶	1.2 \pm 1.4	0.7 \pm 1.1	0.005 *
Lissamine green conjunctival staining (0–20 scale) ²⁷	4.2 \pm 3.9	2.6 \pm 2.7	0.006 *
Lid wiper epitheliopathy (0–3 scale) ²⁸	0.6 \pm 0.8	0.6 \pm 0.7	0.60
Line of Marx (0–3 scale) ²⁹	0.6 \pm 0.5	0.8 \pm 0.7	0.02
Palpebral conjunctival hyperemia (1–4 scale) ²⁶	1.4 \pm 0.5	1.4 \pm 0.6	0.86
Lid roughness (1–4 scale) ²⁶	1.3 \pm 0.4	1.4 \pm 0.5	0.84
Meibomian gland dropout percentage (0–100%) ⁵	24.0 \pm 10.6	22.6 \pm 12.9	0.34
Meiboscore (0–3 scale) ⁷	2.6 \pm 0.6	2.4 \pm 0.6	0.06 NS!
Schirmer test I, mm	22.7 \pm 10.9	22.5 \pm 11.1	0.92

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MG Atrophy was NOT Associated with CL Wear



Results Conflict with Arita et al. 2009

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Comparison of Morphological and Functional Meibomian Gland Characteristics Between Daily Contact Lens Wearers and Nonwearers

Anna Machalińska, MD, PhD,† Aleksandra Zakrzewska, MD,*† Bogdan Adamek, MD, PhD,†
Krzysztof Safranow, MD, PhD,‡ Barbara Wiszniewska, PhD,* Mirosław Parafiniuk, MD, PhD,§
and Bogusław Machaliński, MD, PhD¶*

- Machalinska et al. 2015 came to the same conclusion when using same study design as Pucker et al. 2015 (published same month!)

Cornea 2015

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Clinical factors associated with contact lens dropout

Andrew D. Pucker^{a,*}, Lisa A. Jones-Jordan^b, Sebastian Marx^c, Daniel R. Powell^d, Justin T. Kwan^e,
Sruthi Srinivasan^f, Wolfgang Sickenberger^e, Lyndon Jones^f, Contact Lens Assessment of
Symptomatic Subjects (CLASS) Study Group

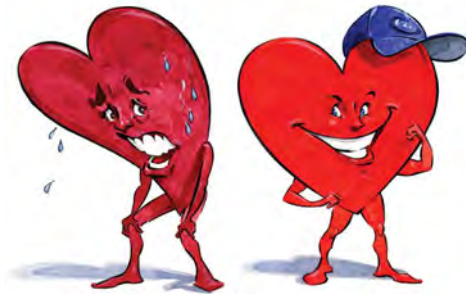


Association of German Contact Lenses-
Specialists and Optometrists

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Purpose

- The purpose of this study was to determine factors that may impact CL dropout by comparing CL dropouts to healthy CL wearers



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Study Design

- Single visit study was conducted at 5 clinical sites
- Subjects were 18- to 45-years-old (avoid presbyopic patients)
- CL wearers reported without CLs
- Similar inclusion and exclusion criteria as first study



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Subjects

- Cases – Discontinued CLs because of discomfort 6 to 12 months ago
- Controls – Age- and sex-matched asymptomatic CL wearers
 - ≥ 8 hours/day, ≥ 5 days/week, CLDEQ-8 scores ≤ 10



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Protocol

- CL history and SPEED questionnaires
- Keratograph 5M
 - Non-invasive tear break-up time
 - Tear meniscus height
 - Meibography
- Slit-Lamp Biomicroscopy
 - Blepharitis assessment
 - Meibum quality and expression
- Dry eye was diagnosed if a subject had
 - SPEED score > 5.0
 - NITBUT of < 10 s or a TMH of < 0.2 mm



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Cornea

Psychometric Analysis of the SPEED Questionnaire and CLDEQ-8

Andrew D. Pucker,¹ Bradley E. Dougherty,² Lisa A. Jones-Jordan,² Justin T. Kwan,³ Carolina M. E. Kunnen,⁴ and Sruthi Srinivasan⁵

- SPEED has been validated for CL and non-CL wearers
- SPEED focuses on dry eye-specific symptoms

Symptoms	0	1	2	3
Dryness, Grittiness or Scratchiness				
Soreness or Irritation				
Burning or Watering				
Eye Fatigue				

0 = Never 1 = Sometimes 2 = Often 3 = Constant

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Subject Demographics – 56 Matched Pairs

Compliance Factor	Contact Lens Wearers (Mean ± SD)	Contact Lens Dropout (Mean ± SD)	P-Value
Age at First CL Use (Years)	17.27 ± 6.72	18.68 ± 5.50	0.19
Total CL Use (Years)	10.86 ± 6.52	7.82 ± 6.74	0.01
Wear Time Per Day (Hours)	13.47 ± 2.92	11.20 ± 3.56	<0.001
Days of CL Use (Days/Week) (%)			
≤ 4 days	1.8	67.3	<0.001
5 days	23.6	9.1	
6 days	30.9	5.5	
7 days	43.6	18.2	

* 60.7% of cases/controls were female

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Dry Eye Testing

Variable	Contact Lens Wearers (Mean ± SD)	Contact Lens Dropout (Mean ± SD)	P-Values
SPEED Score (units)	2.62 ± 2.66	6.42 ± 4.96	<0.001
Diagnosed Dry Eye	0.05	0.32	<0.001
Non-Invasive Tear Break-Up Time (seconds)	12.33 ± 8.14	11.36 ± 8.61	0.41
Tear Meniscus Height (mm)	0.30 ± 0.10	0.28 ± 0.10	0.24
Blepharitis Grade			
Upper Eyelid (0-4 scale)	0.46 ± 0.66	0.71 ± 0.83	0.09
Lower Eyelid (0-4 scale)	0.20 ± 0.52	0.38 ± 0.65	0.09

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MG Testing

Variable	Contact Lens Wearers (Mean ± SD)	Contact Lens Dropout (Mean ± SD)	P-Values
Number of Plugged Meibomian Glands			
Upper Eyelid (0-3 scale)	0.64 ± 0.82	1.24 ± 1.01	<0.001
Lower Eyelid (0-3 scale)	0.71 ± 0.93	1.06 ± 1.00	0.04
Meibum Quality			
Upper Eyelid (0-4 scale)	0.66 ± 1.00	1.37 ± 1.53	<0.001
Lower Eyelid (0-4 scale)	0.68 ± 1.15	0.94 ± 1.20	0.26
Meibomian Gland Atrophy (Meiboscore)			
Upper + Lower Eyelid (0-6 scale)	2.13 ± 0.66	2.22 ± 1.05	0.57
Upper Eyelid (0-3 scale)	1.02 ± 0.30	1.05 ± 0.49	0.64
Lower Eyelid (0-3 scale)	1.11 ± 0.59	1.16 ± 0.76	0.66

- MG atrophy did NOT have an impact on CL dropout

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Odds of CL Dropout by MG Factor

Variable	Odds Ratio	P-Value
Upper Eyelid MG Plugging	4.95	0.0004
Lower Eyelid MG Plugging	1.65	0.05
Upper Eyelid Meibum Quality	2.73	0.005
Lower Eyelid Meibum Quality	1.21	0.26
Upper Eyelid MG Tortuosity	1.74	0.02
Lower Eyelid MG Tortuosity	0.47	0.05

Protective?

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Impact of meibomian gland width on successful contact lens use

Andrew D. Pucker^{a,*}, Lisa A. Jones-Jordan^b, Carolina M.E. Kunnen^c, Sebastian Marx^d, Daniel R. Powell^e, Justin T. Kwan^f, Sruthi Srinivasan^g, Wolfgang Sickenberger^d, Lyndon Jones^g, Contact Lens Assessment of Symptomatic Subjects (CLASS) Study Group



- Successful CL wear does not appear to be clinically influenced by MG width or other measures of MG structural integrity.
- Lower eyelid MGs were wider than upper eyelid MGs and narrower lower eyelid MGs were associated with worse MG expressibility, suggesting that narrower MGs may produce abnormal meibum.
- Data also suggests that MG factors of both eyelids should be evaluated in practice.

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











Morphological characteristics of Meibomian Glands and their Influence on Dry Eye disease in contact lens wearers

Anke von Ahrenschildt ^{a, b}, Laura Hanenberg ^b, Matthew L. Robich ^c, Lisa A. Jones-Jordan ^c, Sebastian Marx ^b, Wolfgang Sickenberger ^{a, b}, Daniel R. Powell ^d, Justin T. Kwan ^e, Stephanie Wong ^f, Sruthi Srinivasan ^f, Lyndon Jones ^f, Andrew D. Pucker ^{f, g, h}, Contact Lens Assessment of Symptomatic Subjects (CLASS) Study Group

- Dry Eye Assessment and Management (DREAM) Study has described several new MG morphology metrics: distorted, tortuous, hooked, abnormal gap, overlapping, fluffy areas, tadpoling, thinned, thickened, ghost, no extension to lid margin, shortened, and dropout (atrophy)

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DREAM Study Metrics

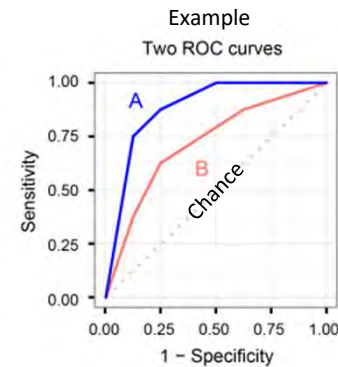
Morphological Variation of Meibomian Glands	Metric Definition ¹	Grading: total number
	Distorted glands show mostly the parallel orientation of normal glands but are a little curvy instead of straight. "The distortion is less than that of a tortuous gland." ¹	Grading: total number
	Tortuous glands family reminiscent of a patchwork. "They must have at least one prominent tortuous configuration (sharp curve)." ¹	Grading: total number
	"Hooked glands curl back at the distal end, resembling a fishhook." ¹	Grading: total number
	Abnormal gaps are areas without glands. They often occur in a result of two adjacent tortuous/distorted glands. "The width of the gap between them is at least twice that of a normal gland." ¹	Grading: binary yes/no
	Neighboring glands cross over/under each other. Individual crossings are counted.	Grading: total number
	Bright white confluent areas where the structure of the individual gland is no longer visible.	Grading: binary yes/no
	"Glands are thick at the eyelid margin but taper and thin out distally." ¹ A tadpoling gland is neither thinned nor thickened.	Grading: binary yes/no
	"Thinned/Attenuated glands have a width that is (overall) less than half the width of a normal gland." ¹ A thinned gland is not tadpoling.	Grading: total number
	"Thickened glands have a width that is equal to or more than twice the width of a normal gland." ¹ Sometimes accompanied by structural alterations. A thickened gland is not tadpoling.	Grading: total number
	Seemingly proceeding from the distal end, glands start to lose their normal structure. They appear pale, almost invisible.	Grading: total number
	Glands are interrupted short of the lid margin. Although traces of glandular tissue can still be found on the lid margin.	Grading: binary yes/no
	"The gland does not extend to its full normal length." ¹	Grading: total number
	"An empty space where a gland should have been observed." ¹ Ghost glands are not classified as dropout exit.	Grading: total number

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MG Morphology is NOT Interpedently Predictive of Dry Eye Disease

Metric – Right Eye	P-Value	Area Under Curve (95% CI)
Thickened (Total Number)		
Upper Eyelid	0.046	0.64 (0.50, 0.78)
Lower Eyelid	0.100	0.61 (0.48, 0.74)
Upper + Lower Eyelid	0.007	0.69 (0.56, 0.81)
Atrophy (Total Number)		
Upper Eyelid	0.043	0.63 (0.51, 0.75)
Lower Eyelid	0.766	0.53 (0.42, 0.63)
Upper + Lower Eyelid	0.252	0.61 (0.49, 0.73)

- Meaningful area under the curve in ROC analysis are > 0.70




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Conclusions

- CL dropout may be precipitated by underlying dry eye symptoms
 - Although most dry eye signs (with the exception of MG structure and function) had minimal predictive value for CL dropout
- Evidence suggests that practitioners should screen for and educate CL patients about the importance of maintaining healthy MGs

CONTROVERSY

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ELSEVIER

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Contact Lens and Anterior Eye

journal homepage: www.elsevier.com/locate/clae



Review article

A review of meibomian gland structure, function, and contact lens wear

Erin M. Rueff^{a,*}, Anna A. Tichenor^b, William Ngo^{c,d}, Andrew D. Pucker^e

^a The Southern California College of Optometry at Marshall B Ketchum University, 2575 Yorba Linda Blvd, Fullerton, CA 92831, USA
^b Indiana University School of Optometry, 800 E Atwater Ave, Bloomington, IN 47405, USA
^c Centre for Ocular Research & Education (CORE), University of Waterloo School of Optometry & Vision Science, 200 University Avenue W, Waterloo, ON N2L 3G1, Canada
^d Centre for Eye and Vision Research (CEVR), 17W Hong Kong Science Park, Hong Kong
^e University of Alabama at Birmingham School of Optometry, 1716 University Blvd, Birmingham, AL 35233, USA

- Literature contains conflicting results, though when controlling for both age and sex, contact lenses do not appear to have an impact on MG morphology

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Can Meibomian Glands Regenerate?

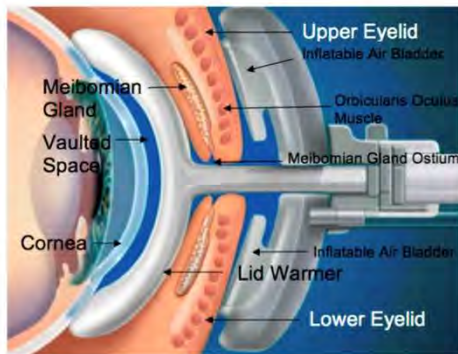
- Determine the morphological and biological factors associated with effectively treating obstructive meibomian gland dysfunction



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Long-Term (3 Year) Effects of a Single Thermal Pulsation System Treatment on Meibomian Gland Function and Dry Eye Symptoms

Jack V. Greiner, M.S., O.D., D.O., Ph.D.



- One thermal pulsation treatment (n = 20) resulted in a significant improvement in meibomian gland function (secretion scores) and ocular symptoms (OSDI) at 3 years

2016

79

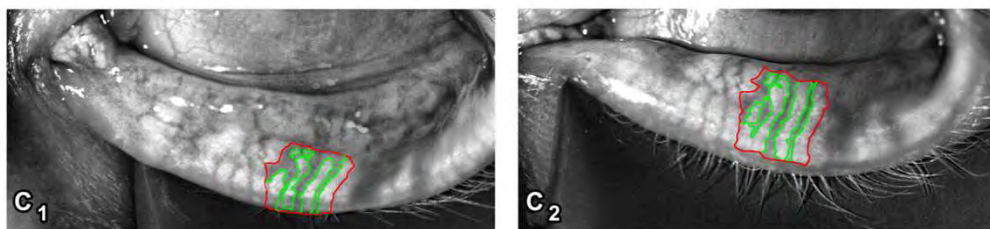
Clinical Ophthalmology

Dovepress

8 Small Animal Eye Society

ORIGINAL RESEARCH

Visible Meibomian Gland Structure Increases After Vectored Thermal Pulsation Treatment in Dry Eye Disease Patients with Meibomian Gland Dysfunction



- Treatment with thermal pulsation (n = 30) resulted in 69% of the treated eyes having a visible increase in meibomian glands 1 year post-treatment

Hura et al. 2020

80

Contents lists available at ScienceDirect

Contact Lens and Anterior Eye

journal homepage: www.elsevier.com/locate/clae

The relationship between tear film MMP-9 and meibomian gland changes during soft contact lens wear

Waleed Alghamdi^{a,b,c,e}, Maria Markoulli^b, Eric Papas^b

- MMP-9 levels were increased during the early CL wear period, which is the same period when MG atrophy increased

Clinical science

OPEN ACCESS

Topical diquafosol for patients with obstructive meibomian gland dysfunction

Reiko Arita,^{1,2,3} Jun Suehiro,⁴ Tsuyoshi Haraguchi,⁴ Shuji Maeda,⁵ Koshi Maeda,⁵ Hideaki Tokoro,⁴ Shiro Amano²

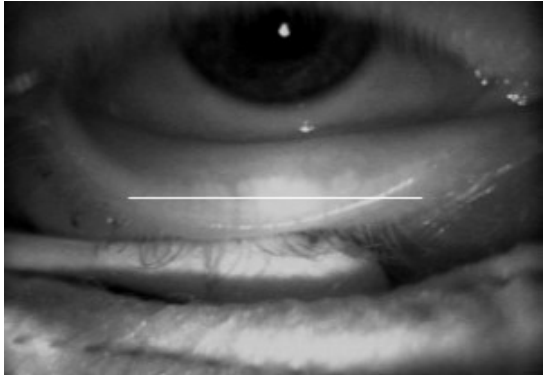
- Treatment with topical diquafosol 3% ophthalmic solution resulted in an average of a 4.6% increase in visible MGs at least 4 months

81

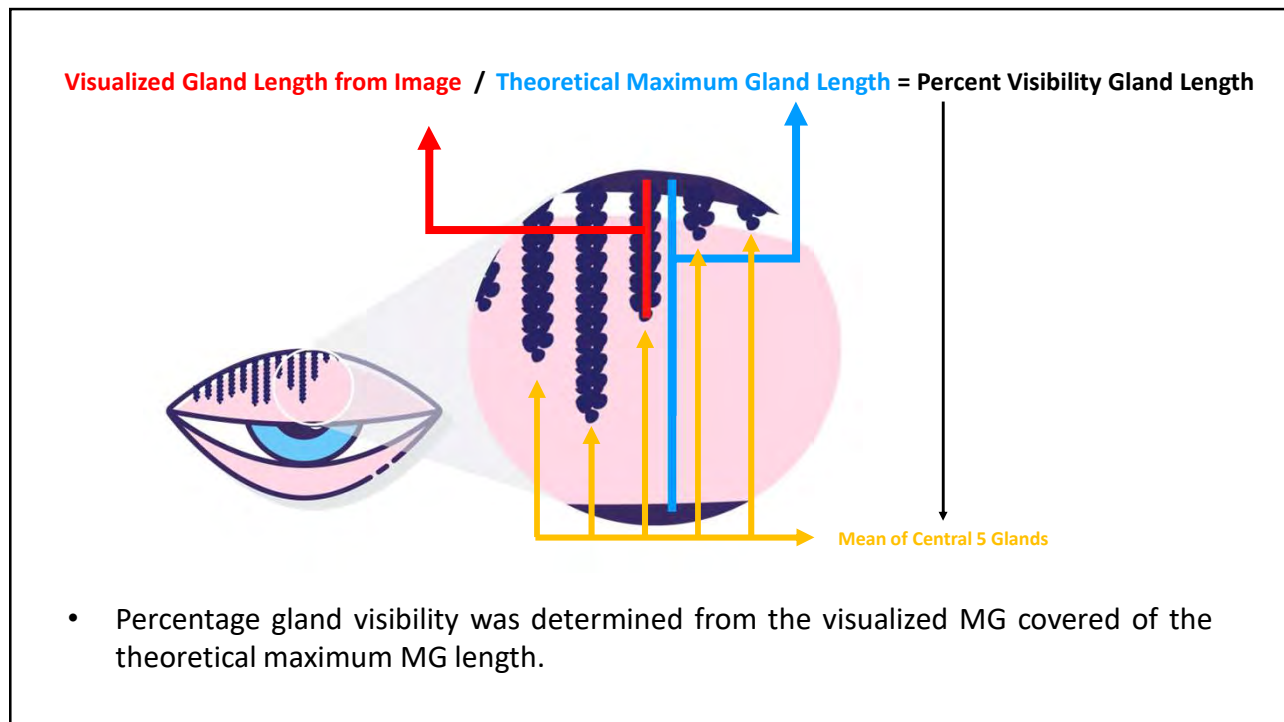
Comparing Optical Coherence Tomography and Keratograph 5M-Based Meibomian Gland Imaging

Swetha Ravichandran, MOptom; Andrew D. Pucker, OD, PhD, FAAO

- The goal of this pilot study was to begin to understand the nature of the MG changes noted in past MG treatment studies.
- Adults between 18 and 40 years were recruited.



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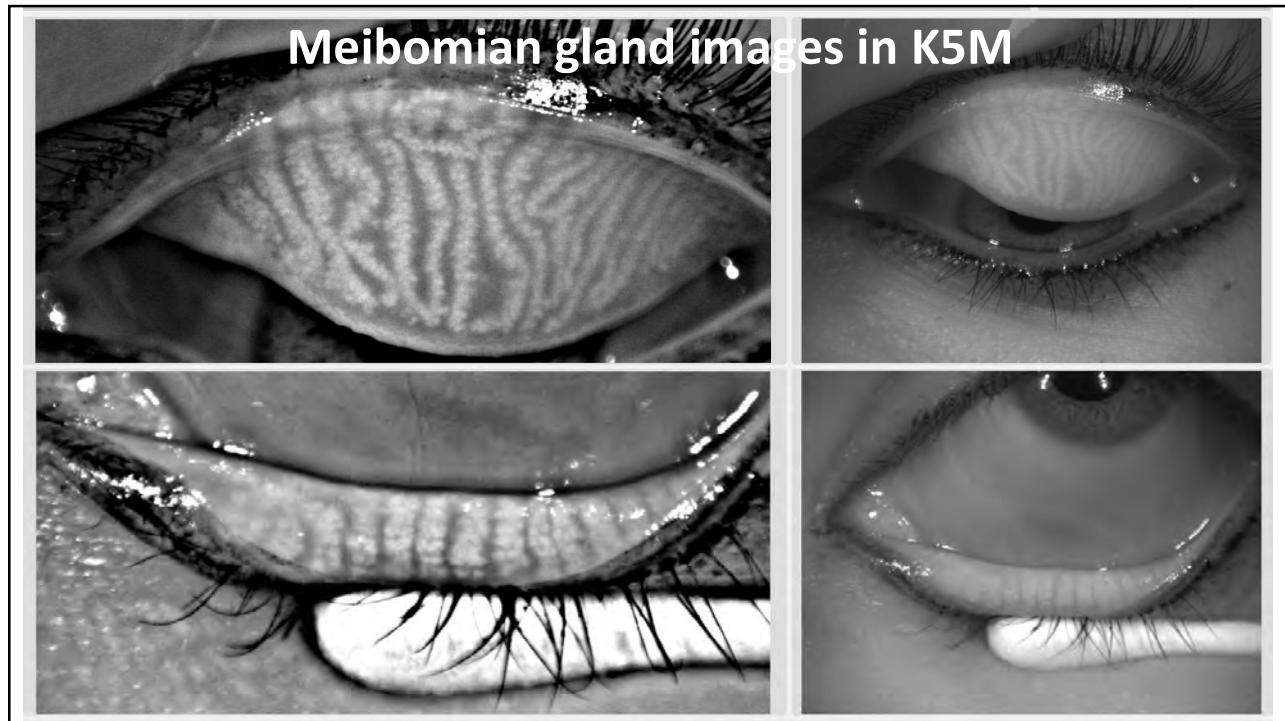


83

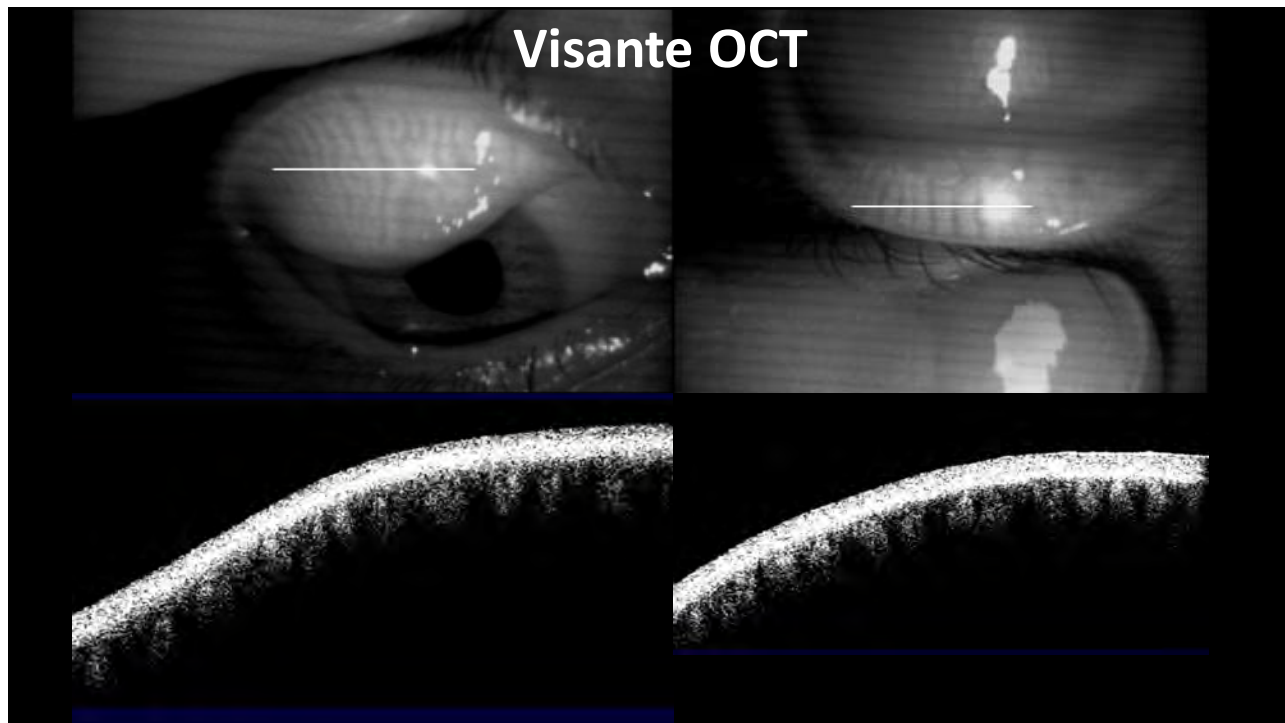
Demographics and Dry Eye Assessment Results

Characteristics	Representation	n = 30
Age, years	Median ± IQR	23.0 ± 5.0
Sex, n (%)	Male	14 (46.6%)
	Female	16 (53.3%)
Visual Acuity, (LogMAR)	Median ± IQR	0.01 ± 0.05
Tear Meniscus Height (mm)	Median ± IQR	0.23 ± 0.12
NIK BUT (seconds)	Median ± IQR	12.49 ± 13.14
SPEED (0-28 units)	Median ± IQR	2.00 ± 5.75

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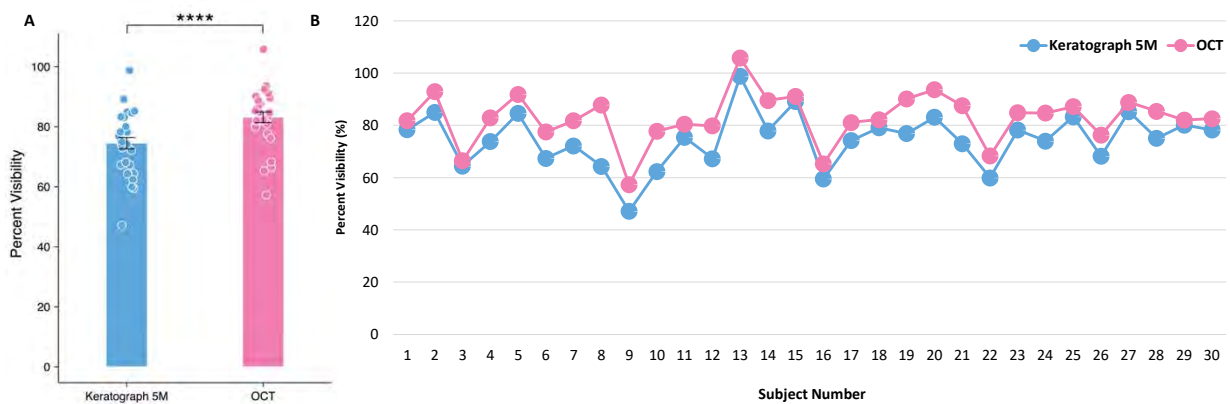
86

Meibomian Gland Morphology Characteristics by Imaging Device and Eyelid

	Keratograph 5M (Median ± IQR)	Visante OCT (Median ± IQR)	P-Value
Meiboscore			
Upper Eyelid (0-3 Score)	0.00 ± 1.00	0.00 ± 1.00	0.79
Lower Eyelid (0-3 Score)	0.00 ± 1.00	1.00 ± 2.00	0.003
Mean Gland Length (Central 5 Glands)			
Upper Eyelid (Percent Visibility)	75.19 ± 13.49	82.70 ± 9.64	<0.001
Lower Eyelid (Percent Visibility)	64.11 ± 17.63	81.16 ± 12.69	<0.001

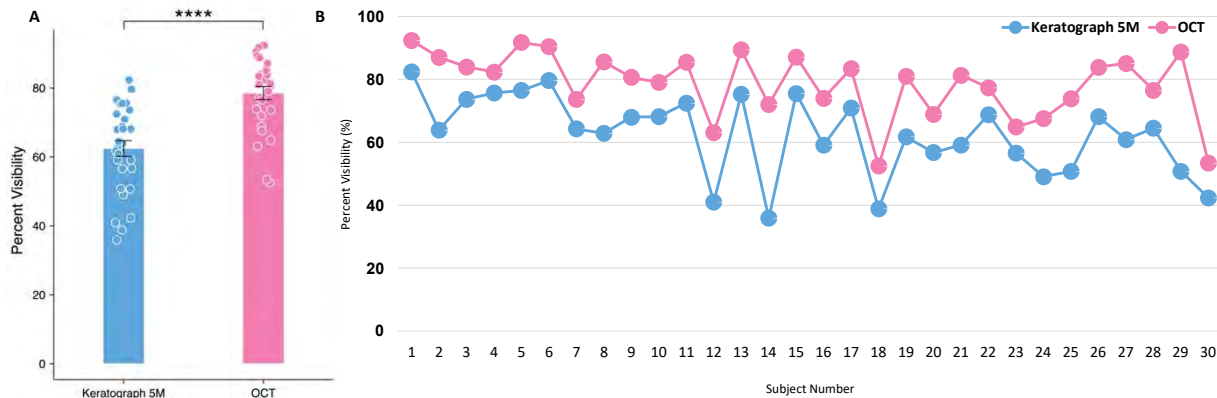
87

Mean Percent Visible Length of the Central Five Meibomian Glands by Device in the Upper Eyelid for All Participants (A) and by Individual Participant (B).



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Mean Percent Visible Length of the Central Five Meibomian Glands by Device in the Lower Eyelid for All Participants (A) and by Individual Participant (B).



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Conclusions

- This study found that Visante-OCT (1,310 nm) images had significantly more visible MGs than Keratograph 5M meibography (840 nm), likely because the longer wavelength used by the Visante-OCT can visualize deeper into the eyelid.
- This suggests that greater MG visibility on traditional meibography devices post-MGD treatment may be due to MG revitalization rather than MG regeneration since the full MG is not always seen with traditional meibography.

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Table 4. Treatment Algorithm for MGD

Stage	Clinical Description	Treatment
1	No symptoms of ocular discomfort, itching, or photophobia. Clinical signs of MGD based on gland expression Minimally altered secretions: grade $\geq 2-4$ Expressibility: 1 No ocular surface staining	<i>Inform</i> patient about MGD, the potential impact of diet, and the effect of work/home environments on tear evaporation, and the possible drying effect of certain systemic medications <i>Consider</i> eyelid hygiene including warming/ expression as described below (\pm)
2	Minimal to mild symptoms of ocular discomfort, itching, or photophobia Minimal to mild MGD clinical signs Scattered lid margin features Mildly altered secretions: grade $\geq 4-8$ Expressibility: 1 None to limited ocular surface staining : DEWS grade 0-7; Oxford grade 0-5	<i>Advise</i> patient on improving ambient humidity; optimizing workstations and increasing dietary omega-3 fatty acid intake (\pm) <i>Institute</i> eyelid hygiene with eyelid warming (a minimum of four minutes, once or twice daily) followed by moderate to firm massage and expression of MG secretions (+) <i>All the above, plus</i> (\pm) Artificial lubricants (for frequent use, non preserved preferred) Topical azithromycin Topical emollient lubricant or liposomal spray Consider oral tetracycline derivatives
3	Moderate symptoms of ocular discomfort, itching, or photophobia with limitations of activities Moderate MGD clinical signs † lid margin features: plugging, vascularity Moderately altered secretions: grade ≥ 8 to <13 Expressibility: 2 Mild to moderate conjunctival and peripheral corneal staining , often inferior: DEWS grade 8-25; Oxford grade 4-10	<i>All the above, plus</i> Oral tetracycline derivatives (+) Lubricant ointment at bedtime (\pm) Anti-inflammatory therapy for dry eye as indicated (\pm)
4	Marked symptoms of ocular discomfort, itching or photophobia with definite limitation of activities Severe MGD clinical signs † lid margin features: dropout, displacement Severely altered secretions: grade ≥ 13 Expressibility: 3 Increased conjunctival and corneal staining , including central staining: DEWS grade 24-35; Oxford grade 11-15 † signs of inflammation: \geq moderate conjunctival hyperemia, phlyctenules	<i>All the above, plus</i> Anti-inflammatory therapy for dry eye (\pm)

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Special Issue

The International Workshop on Meibomian Gland Dysfunction: Report of the Subcommittee on Management and Treatment of Meibomian Gland Dysfunction

Gerd Geerling,¹ Joseph Tauber,² Christophe Baudouin,³ Eiki Goto,⁴ Yukihiko Matsumoto,⁵ Terrence O'Brien,⁶ Maurizio Rolando,⁷ Kazuo Tsubota,⁸ and Kelly K. Nichols⁸



Review article

A review of meibomian gland structure, function, and contact lens wear

Erin M. Rueff^{a,c}, Anna A. Tichenor^b, William Ngo^{a,d}, Andrew D. Pucker^e

- Bring awareness to patients and begin treatment early to promote contact lens comfort!

ARTICLE

Treating Uncomfortable Contact Lens Wear With Orthokeratology

Kim Duong, O.D., M.S., F.A.A.O., Gerald McGwin, Jr M.S., Ph.D., Quentin X. Franklin, B.S., Jared Cox, O.D., and Andrew D. Pucker, O.D., Ph.D., F.A.A.O.

- 72.5% of subjects could be successfully refit into a gas permeable, overnight orthokeratology CL.
- Completed subjects had significantly better CLDEQ-8 and SPEED scores at 3 months compared with baseline.
- Completed subjects had significantly better conjunctival staining scores.

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BCLA
CLEAR
 GLOBAL Contact Lens Evidence-based Academic Report

CLEAR – Medical use of contact lenses

Deborah S. Jacobs^{a,*}, Karen G. Carrasquillo^b, Paul D. Cottrell^c,
 Fernando J. Fernández-Velázquez^d, Raquel Gil-Cazorla^e, Isabelle Jalbert^f, Andrew D. Pucker^g,
 Kellen Riccobono^h, Danielle M. Robertsonⁱ, Loretta Szczotka-Flynn^j, Lynne Speedwell^k,
 Fiona Stapleton^l



Medical Contact Lenses are any type of contact lens that is worn for the primary purpose of treating an underlying disease state or complicated refractive status. Medical contact lenses may or may not correct refractive error. Medical contact lenses are prescribed for reasons other than the cosmetic purpose of eliminating the need for spectacles.

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CLEAR – Medical use of contact lenses

Deborah S. Jacobs^{a,*}, Karen G. Carrasquillo^b, Paul D. Cottrell^c,
 Fernando J. Fernández-Velázquez^d, Raquel Gil-Cazorla^e, Isabelle Jalbert^f, Andrew D. Pucker^g,
 Kellen Riccobono^h, Danielle M. Robertsonⁱ, Loretta Szczotka-Flynn^j, Lynne Speedwell^k,
 Fiona Stapleton^l



Rehabilitative Contact Lenses are lenses that are prescribed for conditions that prevent a patient from achieving adequate visual function with spectacles because of high, irregular, or asymmetric refractive error. Partially or completely occlusive lenses that improve function or cosmesis after trauma, surgery, or stroke also fall into this category.

Therapeutic or Bandage Contact Lenses are lenses that are used for the treatment of ocular discomfort or to support the cornea during healing after surgery or when the cornea is being treated for an underlying disease state or to protect the cornea from the environment or mechanical interaction with the lids.

CLEAR concluded that scleral lenses can play an effective [therapeutic role](#) in ocular surface disease and in the [visual rehabilitation](#) of corneal ectasia and irregular astigmatism.

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LipiFlow for the treatment of dry eye disease (Protocol)

Pucker AD, Rueff E, Ngo W, Tichenor AA, Conto JE

- Data suggest that thermal pulsation is an effective treatment for MGD.

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Patient: Baseline Visit

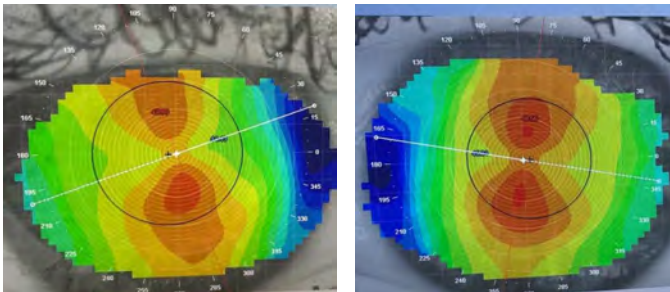


- A 30-year-old female presented for annual exam
- Complaints - dryness, burning, and watering for the past 3 months and CL intolerance
- Symptoms were all worse with CLs
- Diagnosed with dry eye and AT have not helped
- Patient had high astigmatism and was currently wearing piggyback lenses
- Patient has heavy visual demands (Professor)

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Patient: Baseline Visit

Corneal Topographies of OD and OS



Refraction OD: -4.50 -4.00 x 015, 20/20 Ks OD: 44.43/47.90
 OS: -3.25 -4.25 x 165, 20/20 OS: 45.24/48.58

- Soft CLs, Bitoric GPs, and Piggyback
- What is a piggyback lens? And how and when might you fit one?
- What are the CL options for our patient?

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What dry eye testing should be performed?

- Evaporative tests
- Aqueous deficient tests
- Ocular surface damage tests
- Neuropathic pain test?

Dry Eye Test	OD	OS
TBUT	3.7 s	5.0 s
Schirmer's Test	12 mm	14 mm
Corneal Staining	Grade 0	Grade 1
OSDI	27 Units	

NEI Scale ¹⁴ (Density)	NEI Scale (Dot Count)	Modified NEI Scale
Grade 0:	Grade 0: 0 dots	Grade 0: 0 dots
Grade 1:	Grade 1: 1 to 15 dots	Grade 0.5: 1 to 7 dots Grade 1.0: 8 to 15 dots
Grade 2:	Grade 2: 16 to 30 dots	Grade 1.5: 16 to 22 dots Grade 2.0: 23 to 30 dots
Grade 3:	Grade 3: 31 or > dots	Grade 2.5: 31 to 37 dots Grade 3.0: ≥ 38 dots or TNT and must be less than 1/2 area of region; may have confluent* area, but not coalesced** area Grade 3.5: ≥ 38 dots or TNT and must be greater than or equal to 1/2 area of region; may have confluent* area, but not coalesced** area Grade 4.0: must have coalesced area and must have ≥ 38 dots or TNT

Sall et al. 2023

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Proparacaine Test

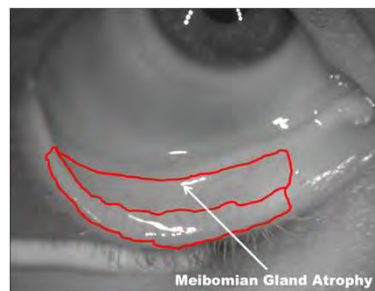
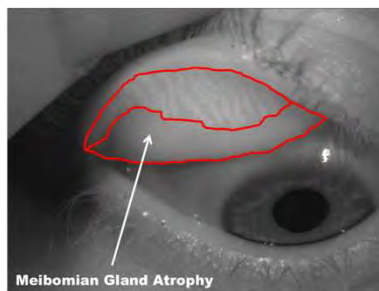
- Neuropathic pain may be present when there is corneal somatosensory dysfunction
- You can test for neuropathic pain by applying 0.5% proparacaine to the conjunctival sac of each eye and waiting 15 seconds
- If pain is still present, it suggests that the patient is suffering from neuropathic pain



Signs \neq Symptoms

99

Keratograph 5M Meibography Images of Right (OD) Upper and Lower Eyelid



Did CL use induce meibomian gland atrophy?

100

Treatment Plan

- Dry eye – Soft steroid trial to get dry eye under control
- Scleral lenses at later visit
- Does patient have dry eye, contact lens discomfort, or both?
- What alternatives could we have done?

101

2-Week Follow Up Visit

- Steroid did not help symptoms...
- What percent of patients benefit from cyclosporin/lifitgrast?
- Scleral lenses were selected based upon the fitting guide

102

Trial Lenses

Lens Parameters	Right Eye (OD)	Left Eye (OS)
Trial Lens Power	Plano DS	Plano DS
Over Refraction	-3.00 -0.25 x 020; 20/20	-4.75 -0.25 x 147; 20/25
Diameter	15.8	15.8
Sag	4.4	4.6
Peripheral Curve	Standard	Standard
Central Lens Clearance	~350 μm	~400 μm

*Slight conjunctival blanching with trial lens

Where did the astigmatism go?

103

Scleral Lenses Ordered

Lens Parameters	Right Eye (OD)	Left Eye (OS)
Power	-3.00 DS	-4.75 DS
Diameter	15.8	15.8
Sag	4.4	4.6
Peripheral Curve	Standard	Standard
Lens Material	Boston XO	Boston XO

104

Evaluation of Ordered Lenses

Lens Parameters	Right Eye (OD)	Left Eye (OS)
Visual Acuity	20/20 ⁻¹	20/30 ⁺²
Over Refraction	+0.25; 20/20 ⁻¹	-1.25; 20/20 ⁻²
Corneal Clearance	~250 μm	~300 μm

*Unexpected over-refraction may have been associated with the ordered lens settling differently than the trial lens

*Mild conjunctival blanching that was greater than at visit 2

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Scleral Lenses Ordered

Lens Parameters	Right Eye (OD)	Left Eye (OS)
Power	-5.12 DS	-5.50DS
Diameter	15.8	15.8
Sag	4.5	4.7
Peripheral Curve	1 Flat	1 Flat
Lens Material	Boston XO	Boston XO

*Patient was allowed to pick lenses up lenses OTC to save a visit

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Habitual Lenses – Finalized

Lens Parameters	Right Eye (OD)	Left Eye (OS)
Power	-5.12 DS	-5.50 DS
Diameter	15.8	15.8
Sag	4.5	4.7
Peripheral Curve	1 Flat	1 Flat
Lens Material	Boston XO	Boston XO
Visual Acuity	20/25 ⁺¹	20/20 ⁻¹
Over Refraction	Plano	Plano
Corneal Clearance	~200 μm	~350 μm

*Patient was happy upon return and lenses were finalized!

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Annual Exam

Habitual Lenses

Lens Parameters	Right Eye (OD)	Left Eye (OS)
Power	-5.12 DS	-5.50 DS
Diameter	15.8	15.8
Sag	4.5	4.7
Peripheral Curve	1 Flat	1 Flat
Lens Material	Boston XO	Boston XO
Visual Acuity	20/25 ⁺¹	20/20 ⁻¹
Over Refraction	Plano	Plano
Corneal Clearance	~100 μm	~500 μm

Why might the patient have blurry vision OS?

Lens Order

Lens Parameters	Left Eye (OS)
Power	-5.50 DS
Diameter	15.8
Sag	4.5
Peripheral Curve	1 Flat
Lens Material	Boston XO

*Dispensed lens OTC to save a visit

108

Follow Up Visit

Lens Parameters	Right Eye (OD)	Left Eye (OS)
Power	-5.12 DS	-5.50 DS
Diameter	15.8	15.8
Sag	4.5	4.5
Peripheral Curve	1 Flat	1 Flat
Lens Material	Boston XO	Boston XO
Visual Acuity	20/25 ⁺¹	20/20 ⁻¹
Over Refraction	+0.25	-0.25
Corneal Clearance	~ 100 μm	~200 μm

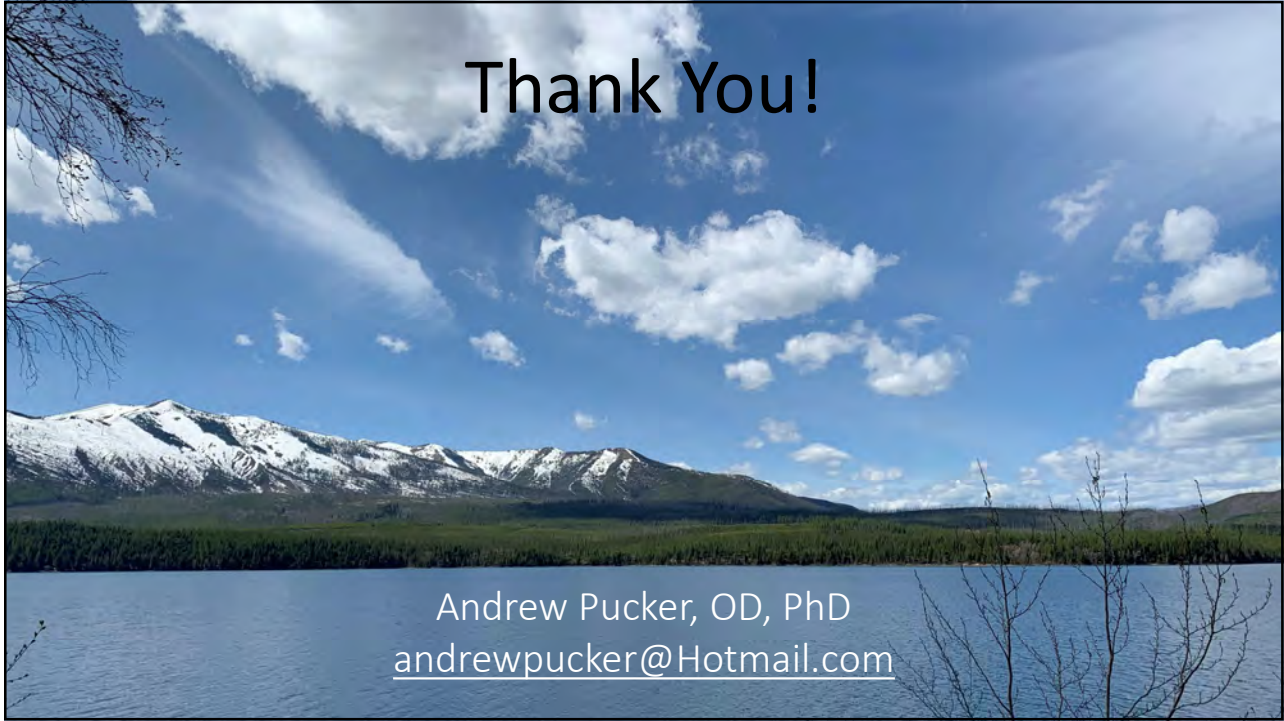
*Patient was happy upon return and lenses were finalized!

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Conclusion

- *MGD is common in CL wearers and a primary source of CL discomfort*
- *Evidence suggests that practitioners should screen for and educate CL wearers about MGD*
- *Research is needed to better understand if meibomian gland atrophy is reversible and if atrophy can be used as a DED diagnostic factor*

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Thank You!

Andrew Pucker, OD, PhD
andrewpucker@Hotmail.com

Dry Eye Practice – *Common Management Myths: What Does the Evidence Say?*

1 Hour Continuing Education Lecture Submission for Cornea, Contact Lens & Contemporary Vision Symposium

Lucy Kehinde Darnell, PhD, OD, FAAO, University of Houston, College of Optometry

Antoinette Antwi, OD, University of Houston, College of Optometry

Course Outline

After a brief overview of dry eye disease classification and management, several popular treatment options will be highlighted. For each of the therapy presented, we will discuss clinical that support their effectiveness, review relevant trials and results, and provide sound alternatives (when available):

1. Introduction
 - a. Title Slide
 - i. Speakers
 - ii. Disclosures
2. Dry eye diagnostic approach
 - a. Complexities
 - b. Symptoms vs signs
3. Treatment
 - a. Review of stepwise therapeutic approach
 - b. Commonplace recommendations
4. Blepharitis/demodex
 - a. Lid hygiene
 - i. Baby shampoo
 1. Discussion of available evidence on effectiveness
 - ii. Commercial lid scrubs
 1. Options
 2. Effectiveness
 - iii. In-office treatments
 1. Lid margin debridement
 2. Bleph-Ex
 3. Zest
 - iv. Pharmaceutical
 1. Azithromycin drops
 2. Xdemvy

5. Meibomian gland dysfunction

a. Omega 3 supplementation

i. Discussion of available evidence on effectiveness of omega 3 supplements

ii. Omega 3 + omega 6 supplementation

b. New dry eye neutraceuticals

c. Warm compresses

i. At-home methods

1. Wash cloth

2. Commercial heat masks

d. In-office interventions

i. ILux

ii. TearCare

iii. Lipiflow

iv. IPL

v. LLLT

e. Orals

i. Doxycycline vs. azithromycin

6. Behavioral recommendations

a. Water intake

b. Caffeine intake

c. Blinking exercises

i. 20-20-20 rule

Current Trends: Treating Dry Eye Disease in Wavelengths

Instructor: Anita Ticak Gostovic, OD, MS & Antoinette Antwi, OD
4401 Martin Luther King Blvd.
Houston, TX 77204-2020
(713)743-6421

- I. Defining Dry eye Disease**
 - a. Definitions
 - a. DEWS II
 - b. International Workshop on Meibomian Gland Dysfunction
 - b. Meibomian Gland Dysfunction
 - a. Anatomy of the gland
 - b. Pathophysiology
 - c. "Accepted" management strategies in practice
 - c. Rosacea
 - a. Etiology
 - b. Pathophysiology
 - c. Current treatments
 - e. Lid issues
 - a. Blepharitis
 - b. Demodex
 - c. Hordeolum/Chalazion
 - d. Surgical Interventions/Post op care

- II. Intense Pulsed Light Therapy**
 - a. What is it
 - b. Historical Use/ Use in dermatology
 - c. Transition to Optometry
 - d. Devices available
 - e. Treatment Protocols
 - f. Indications
 - g. Contra-indications
 - h. Current Literature (Cochrane Review 2020)

- III. Low Level Light Therapy**
 - a. What is it
 - Photobiomodulation defined

- b. Historical Use
- c. Optometry
- d. Devices Available
- e. Treatment Protocols
- f. Indications
- g. Contra-indications
- h. Current Literature

IV. Radio Frequency

- a. What is it
- b. Historical Use
- c. Optometry
- d. Devices Available
- e. Treatment Protocols
- f. Indications
- g. Contra-indications
- h. Current Literature

V. Incorporating it into Practice

- a. What type of Practice Benefits from this
- b. Consultation/Consent
- c. Pre procedural and Post Procedural Care
- d. Combination Treatments
- e. Resources/Platform/Publications

Soft Contact Lens Updates

Biviana Lie, OD & Jean Thomson, OD

University of Houston

12/07/2024

Disclosures

None

Course Goals

1. Marketplace update including discontinuation, parameter expansion, and future products
2. Understanding of current innovations and evidence-based support
3. Awareness of updated technology of soft contact lenses

Current Market

- What different modalities of soft contact lenses are available in the US?
 - How many soft contact lenses are there?
 - Recent discontinuations and future projections?
-

Soft Contact Lenses Available

- ABB
 - EYEDOCK
 - ODSPECS
-

Johnson & Johnson

Dailies Single Vision (SPH/Toric)

- 1 Day Acuvue Moist
- Acuvue Oasys 1 Day
- Acuvue Oasys Max 1 Day**
- 1 Day Acuvue Moist for Astigmatism
- Acuvue Oasys 1 Day for Astigmatism

Dailies Multifocal (SPH only)

- 1 Day Acuvue Moist Multifocal
- Acuvue Oasys Max Multical**

Bi-weekly Single Vision (SPH/Toric)

- Acuvue 2
- Acuvue Oasys
- Acuvue Oasys for Astigmatism

Bi-weekly Multifocal (SPH only)

- Acuvue Oasys Multifocal

Monthly (SPH/Toric)

- Acuvue Vita
- Acuvue Vita for Astigmatism

Colors

- 1 Day Acuvue Define

CooperVision

Dailies Single Vision (SPH/Toric)

- Proclear 1 Day
- Clariti 1 Day
- MyDay
- MyDay Energys**
- Clariti 1 Day Toric
- MyDay Toric

Dailies Multifocal (SPH only)

- Proclear 1 Day Multifocal
- Clariti 1 Day Multifocal
- Clariti 1 Day Multifocal 3 ADD
- MyDay Multifocal

Bi-weekly Single Vision (SPH/Toric)

- Avaira Vitality
- Avaira Vitality Toric

Monthly Single Vision (SPH/Toric)

- Proclear Sphere
- Biofinity (XR)
- Biofinity Energys**
- Proclear Toric (XR)
- Biofinity Toric (XR)

Monthly Multifocal

- Proclear Multifocal (XR)
- Biofinity Multifocal

Myopia Control Lenses

- MiSight 1 Day

Alcon

Dailies Single Vision (SPH/Toric)

- DAILIES AquaComfort Plus (d*)
- DAILIES AquaComfort Plus Toric (d*)
- DAILIES Total 1
- DAILIES Total 1 for Astigmatism
- Precision1
- Precision1 for Astigmatism

Dailies Multifocal (SPH only)

- DAILIES AquaComfort Plus Multifocal
- DAILIES Total 1 Multifocal

Bi-weekly Single Vision (SPH/Toric)

- None

Monthly Single Vision (SPH/Toric)

- Air Optix Aqua (“plus HydraGlyde”)
- Air Optix for Astigmatism 9”plus HydraGlyde”)
- Air Optix Night & Day Aqua
- Total30
- Total30 for Astigmatism
- Total30 Monthly???

Monthly Multifocal

- Air Optix Multifocal (“plus HydraGlyde”)

Colors

- DAILIES COLORS
- Air Optix Colors

Bausch + Lomb

Dailies Single Vision (SPH/Toric)

- Biotrue ONEday (Walmart eureka!)
- Biotrue ONEday for Astigmatism
- Infuse
- Infuse for Astigmatism*
- Soflens daily disposable

Dailies Multifocal (SPH only)

- Biotrue ONEday for Presbyopia
- Infuse Multifocal

Bi-weekly Single Vision/Multifocal (SPH/Toric)

- Soflens 38 (Optima FW)
- Soflens Toric
- Soflens Multifocal

Monthly Single Vision (SPH/Toric)

- Optima 38/SP
- PureVision
- PureVision2
- PureVision2 for Astigmatism
- Biofinity Toric (XR)
- Ultra (Walmart eureka! monthly)
- Ultra for Astigmatism

Monthly Multifocal

- PureVision Multi-Focal
- PureVision2 for Presbyopia
- Ultra for Presbyopia
- Ultra Multifocal for Astigmatism

Recent Parameter Expansions

Johnson & Johnson

- None

CooperVision

- None

Bausch & Lomb

- None

Alcon

- Total30 for Astigmatism
 - -2.75 cyl for -0.50D to -6.00D in 0.50D steps
 - for 10°, 20°, 30°, 70°, 80°, 90°, 100°, 110°, 150°, 160°, 170°, and 180°

-

2023-2024 Discontinuations

Johnson & Johnson

- Acuvue Oasys for Presbyopia (02/01/2022)
- 1 Day Acuvue TruEye (04/01/2023)
- Acuvue (06/30/2024)

CooperVision

- Biomedics 55 Premier (trials d/c May 2025, revenue packs d/c May 2026)
- Biomedics Toric (trials d/c May 2025, revenue packs d/c May 2026)

Alcon

- Total30 for Astigmatism
 - Focus Dailies (9/29/2023)
 - Freshlook Color Blends (9/29/2023)

Bausch & Lomb

- None

Recent Innovations

- What new technologies are being implemented into contact lenses?
- Is there evidence-based research following these marketing claims?
- Which patients are the target demographic?

Advancement in Materials

Brief history

- 1930s - Glass scleral lenses
- 1940s - Rigid, non-GP polymethyl methacrylate (PMMA)
- 1960s/70s - Hydrogel (Dk = 10-50)
- 1990s - Silicone Hydrogel** (Dk = 100-150)

Advancement in Materials

Ocular health impact of Hydrogel vs. Silicone Hydrogel

- SiHy effectively eliminated hypoxia-related events in most patients including:
 - conjunctival/limbal redness
 - Neovascularization
 - Epithelial microcysts
 - Endothelial responses

... while having comparable adverse events and comfort levels

Blue Light Filters in CLs

- Acuvue Oasys Max with OptiBlue Light Filter Technology
 - The OptiBlue™ filter: filters 60% of blue-violet light ^{±+3} and is designed to provide enhanced clarity of vision when using a computer or digital device
- Total30 with Blue-Violet Light Reduction filters 34% blue-violet light rays
- Disclaimers present on both lenses stating lack of evidence for health benefits

Blue Light Filters in CLs

Evidence: Review of 17 randomized control trials

- Improve visual performance?
 - No effect on BCVA or subjective visual fatigue
 - No evidence of improves contrast sensitivity, colour discrimination, discomfort glare, or overall patient satisfaction
- Retinal protection?
 - No evidence of macular health improvement
- Sleep quality improvement?
 - Indeterminate results

Digital Lifestyle Adaptations

Digital eye strain: visual disturbance and/or ocular discomfort related to digital device use

Estimated up to 90% of digital device users suffers from digital eye strain

Current management options:

- Reducing average daily screen time
- Frequent blinking
- Improved lighting/minimizing glare
- Breaks from screen
- 20-20-20 rule

Digital Lifestyle Adaptations

CooperVision MyDay Energys & Biofinity Energys with DigitalBoost Technology

- Single vision aspheric lens design with a +0.3D boost to help relax accommodation during prolonged digital device use
- Only brand on the market with mini ADD for single vision lenses

However....

Myopia Management

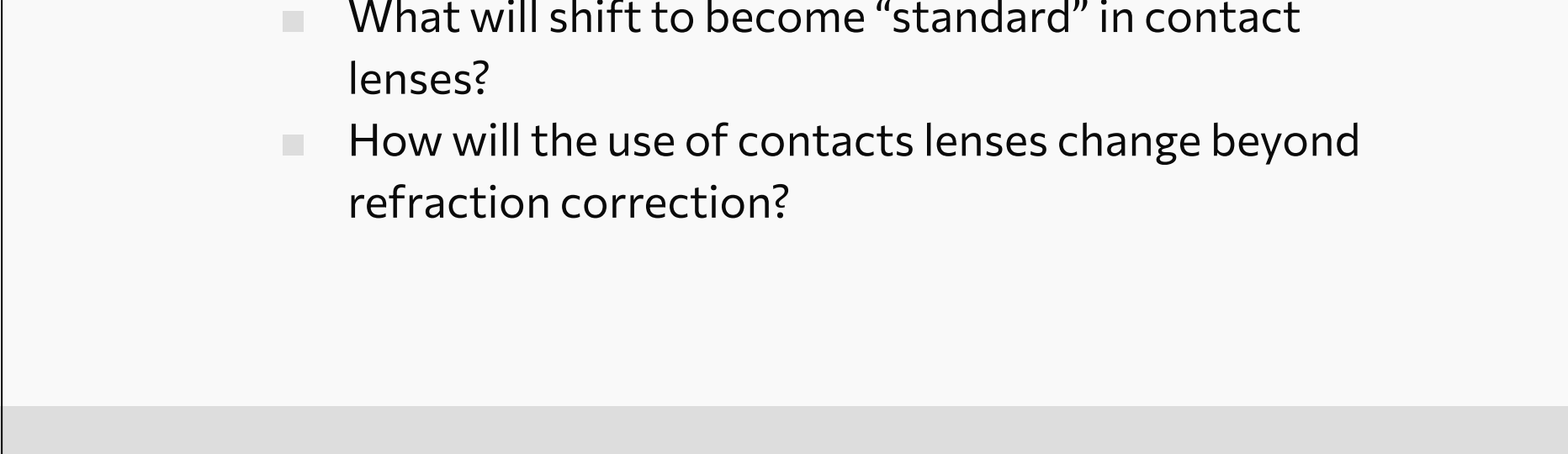
MiSight by CooperVision

- Only FDA-approved soft contact lens for myopia control in children ages 8-12 years old
- MOA: dual-focus optical design with central distance correction with concentric peripheral zones of alternating myopic defocus
- Research proves effectivity with 10 hours of wear at least 6x/week

Current trials:

- PROTECT trial - NaturalVue multifocal soft contact lens
 - 3-year multinational, double-masked, randomized controlled trial (RCT)
 - MOA: center-distance lens with a catenary curve of +8.00D of ADD by the time it reaches 6mm from the center of the lens
 - Current available 1-year data appears to validate VTI's expectation of effectivity

Future products

- What new contact lenses should we expect in the future?
 - What will shift to become “standard” in contact lenses?
 - How will the use of contact lenses change beyond refraction correction?
- 



Advances in Drug Delivery through Soft Contact Lenses

Drug Delivery for Glaucoma

01

CL vs. eye drop

Greater ocular retention and sustained drug release

- Equal to drop at 5 min
- Stark difference at 1 hr
- Still present at 8 hrs

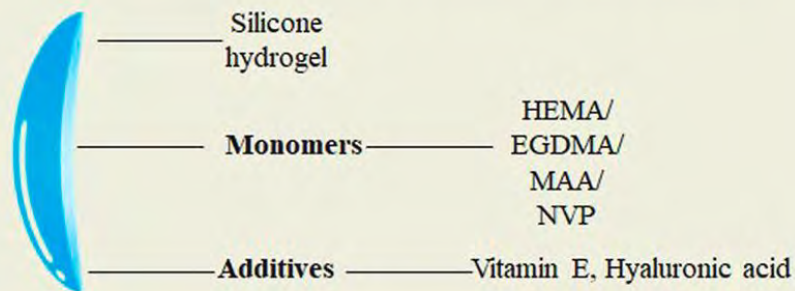
02

Materials

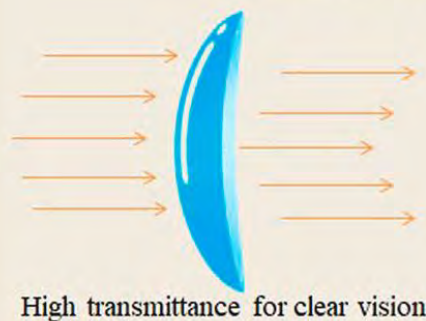
Comfort, durability, vision correction

- Biocompatible, non-irritating, oxygen permeable, water content

Materials used in contact lens fabrication



Contact lens evaluation parameters

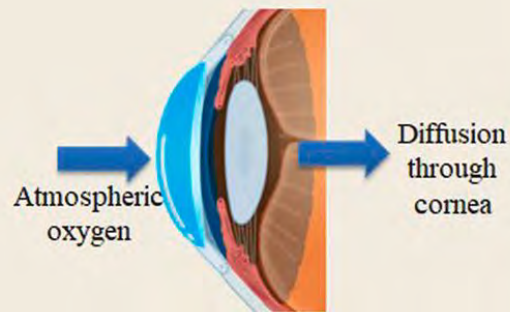


No protein deposition seen on using anti-fouling agents



Liposome
Micelles
Microemulsion

■ Drug particles
■ Drug laden nanoparticles



Oxygen permeation through the cornea

Increasing Shift Towards Daily Disposable Lenses



2000 - 2023 %

20 countries
17.1% to 46.7% of soft lens
fits

Explanation

Better visual performance
Improved ocular health
New lens designs
Greater Parameter ranges

2019-2023 Data

47% Daily
42% monthly
9% 1-2 weekly
2% ≥ 3 monthly

Toric Daily Disposable Multifocal?

Potentially coming soon

Questions?

References

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- Musgrave CSA, Fang F. Contact Lens Materials: A Materials Science Perspective. *Materials (Basel)*. 2019;12(2):261. Published 2019 Jan 14. doi:10.3390/ma12020261
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Thank you!



PRESCRIBING GAS PERMEABLE CORNEAL LENSES

CLARKE D. NEWMAN, OD, FAAO, FBCLA, FSLS, FNAP
2024 CORNEA, CONTACT LENS AND CONTEMPORARY
VISION CARE SYMPOSIUM

DECEMBER 7, 2024

COPE #: ??????-CL

FINANCIAL DISCLOSURES

- PAID CONSULTANT
 - GPLI
 - REVIEW OF OPTOMETRY
 - PERCEPT
 - TARSUS
- CONTRIBUTING EDITOR: *CONTACT LENS SPECTRUM*
- STUDY CONTRIBUTOR: UHCO
- NO PROPRIETARY INTEREST IN ANY SUBJECTS DISCUSSED
- FDA “OFF-LABEL” USES WILL BE DISCUSSED

COURSE DESCRIPTION

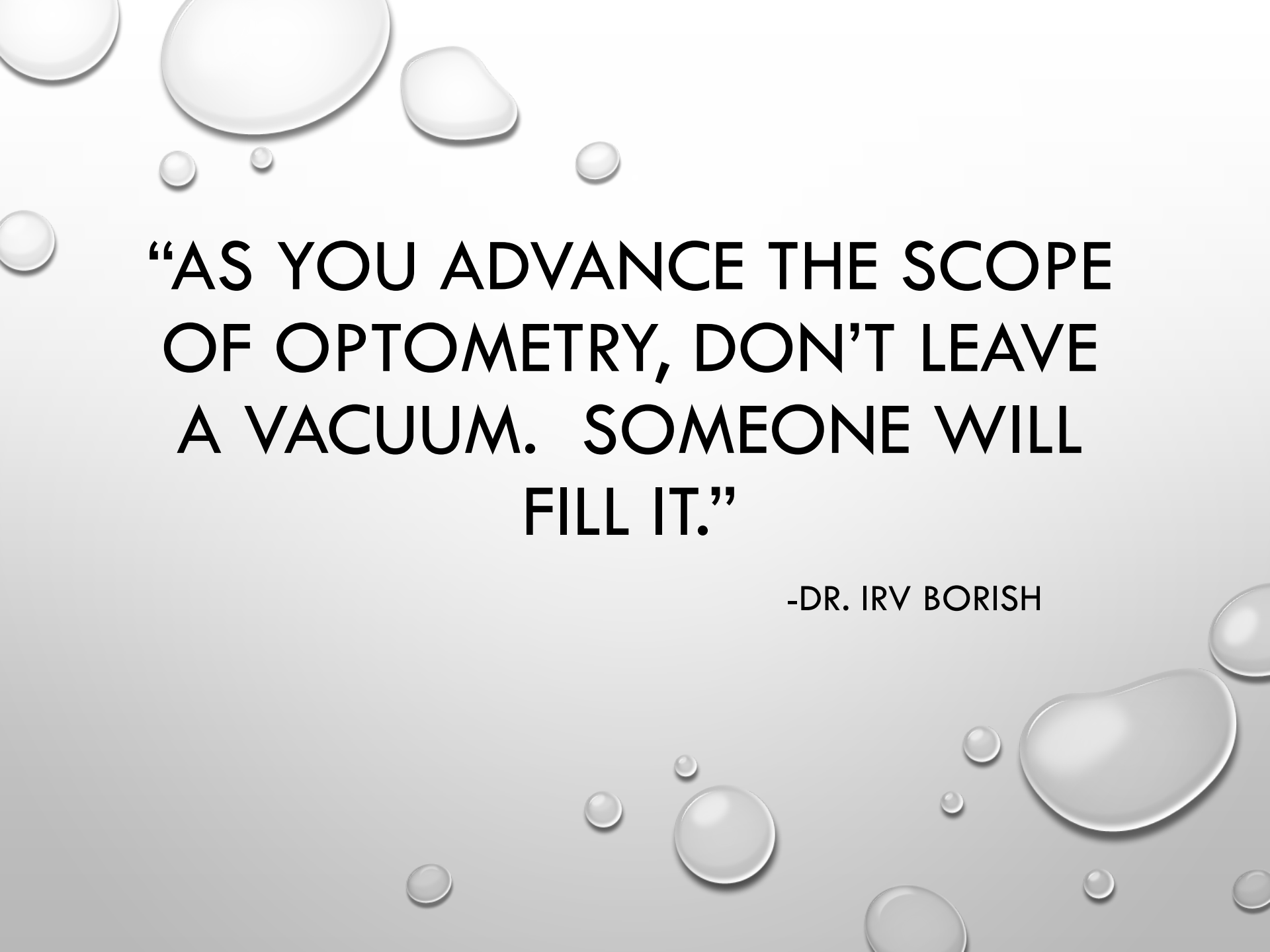
THIS ONE-HOUR COURSE WILL DISCUSS HOW TO DESIGN AND PRESCRIBE GAS-PERMEABLE, CORNEAL CONTACT LENSES AND A FEW TRICKS FOR IMPROVING THE PERFORMANCE OF CORNEAL AND SCLERAL GP LENSES

LEARNING OBJECTIVES

- THE ATTENDEES WILL LEARN THE LATEST METHODS AND SOME OF THE OLDEST METHODS FOR PRESCRIBING GP CORNEAL CONTACT LENSES.
- ALSO, COVERED WILL BE HOW TO DEAL WITH RESIDUAL ASTIGMATISM

The background of the slide is a light gray gradient. It is decorated with numerous water droplets of various sizes and shapes, scattered across the top and bottom edges. The droplets are rendered with realistic shading and highlights, giving them a three-dimensional appearance. The word "INTRODUCTION" is centered in the middle of the slide in a bold, black, sans-serif font.

INTRODUCTION

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The text is centered in the upper half of the slide.

**“AS YOU ADVANCE THE SCOPE
OF OPTOMETRY, DON’T LEAVE
A VACUUM. SOMEONE WILL
FILL IT.”**

-DR. IRV BORISH

WHAT'S THE POINT

- TO CORRECT RESIDUAL ASTIGMATIC ERRORS THAT DEGRADE THE QUALITY OF THE PATIENT'S VISION
 - PHYSIOLOGICAL RESIDUAL ASTIGMATISM (P.R.A.)
 - INDUCED RESIDUAL ASTIGMATISM (I.R.A.)
- TO CORRECT POOR PHYSIOLOGICAL ALIGNMENT

HOW OFTEN DO WE NEED TORIC CORNEAL GP'S?

- IF THE AVERAGE EYE CARE PRACTITIONER PRESCRIBES RGP LENSES 9% OF THE TIME, (GIVE-OR-TAKE), AND
- ABOUT 30% OF THOSE PATIENTS HAVE CLINICALLY SIGNIFICANT PHYSIOLOGIC RESIDUAL ASTIGMATISM, AND
- ANOTHER 5%-10% COULD USE SOME FORM OF TORICITY ON THE POSTERIOR LENS SURFACE TO IMPROVE PHYSIOLOGY AND / OR COMFORT, THEN
- 5% (UH, THAT'S ONE-IN-TWENTY) OF YOUR PATIENTS SHOULD BE WEARING SOME FORM OF TORIC RGP LENS IN ONE, OR BOTH, OF THEIR EYES.
- HOWEVER, THE NUMBER OF PATIENTS IN YOUR PRACTICE THAT ARE CANDIDATES FOR RGP TORIC LENS CORRECTION IS ABOUT 30 %!!!
- BLUM, 1959, FOUND THAT RESIDUAL ASTIGMATISM DEGRADED ACUITY MUCH FASTER, GIVEN THE MAGNITUDE OF THE CYLINDER, IN MYOPES COMPARED TO HYPEROPES, AND THAT RESIDUAL CYLINDER DEGRADED ACUITY MUCH FASTER IN SMALLER MAGNITUDES OF SPHERICAL ERROR

IRREGULAR CORNEAS

- A RECENT RETROSPECTIVE STUDY PRESENTED AT GSLS IN JANUARY DEMONSTRATED THAT, FOR CORNEAS THAT HAD LESS THAN 350 MICRONS OF DIFFERENCE IN FRONT SURFACE ELEVATION, ALONG THE MERIDIAN WITH THE GREATEST DELTA, 37% ONE COULD SUCCESSFULLY PRESCRIBE A CORNEAL GP LENS.
- FOR CORNEAS WITH DELTAS OF LESS THAN 100 MICRONS, 96% COULD WEAR CORNEAL GP LENSES SUCCESSFULLY
- FOR CORNEAS WITH A DELTA OF BETWEEN 101 AND 200 MICRONS, 94% COULD WEAR CORNEAL GP LENSES SUCCESSFULLY
- ABOVE 350 MICRONS, 100% NEEDED A SCLERAL LENS

-Kojima R, Caroline P, Lampa M, *et al*, 2023

The image features a light gray gradient background with several realistic water droplets of various sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance. The text is centered in the middle of the page.

LET'S JUST SAY THAT WE NEED 'EM

THE QUESTIONS STAY THE SAME, BUT THE ANSWERS CHANGE

- THE NEW LATHES ALLOW THE PRACTITIONER TO DESIGN AND PRODUCE EXACT AND COMPLEX LENS GEOMETRIES THAT WERE NOT POSSIBLE ONLY EIGHT YEARS AGO
- ONE CAN ALSO REPRODUCE THESE LENS DESIGNS WITH A HIGH DEGREE OF FIDELITY

THE MODERN MANUFACTURING PROCESS

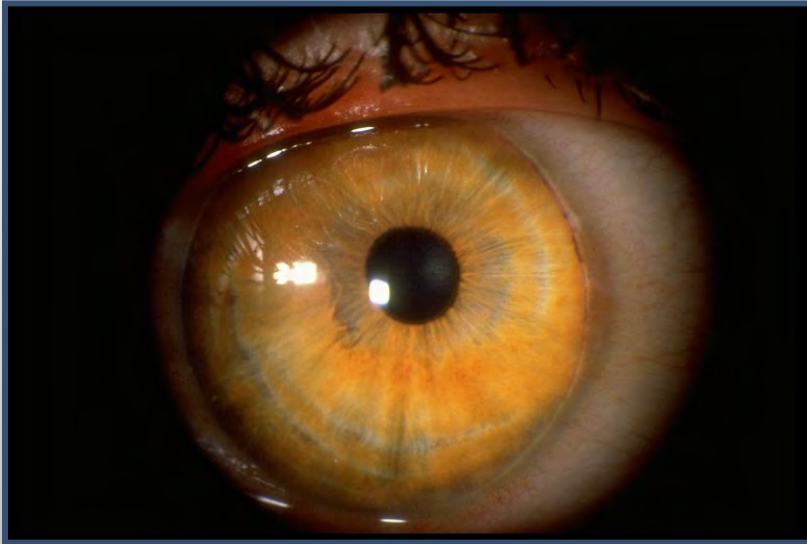
- THE HIGH-SPEED CNC SIX AXIS LATHE
- OSCILLATING FEATURE FOR ROTATIONALLY NON-SYMMETRIC DESIGNS (QUADRANT SPECIFIC)
- LASER ALIGNING FEATURES FOR INSURING ANTERIOR AND POSTERIOR MERIDIONAL ALIGNMENT
- LASER MARKING OF MERIDIANS

The background of the slide features a light gray gradient with several realistic water droplets of various sizes scattered across the surface. The droplets are rendered with soft shadows and highlights, giving them a three-dimensional appearance. They are primarily located in the upper-left and lower-right corners, with a few smaller ones in the center and lower-left areas.

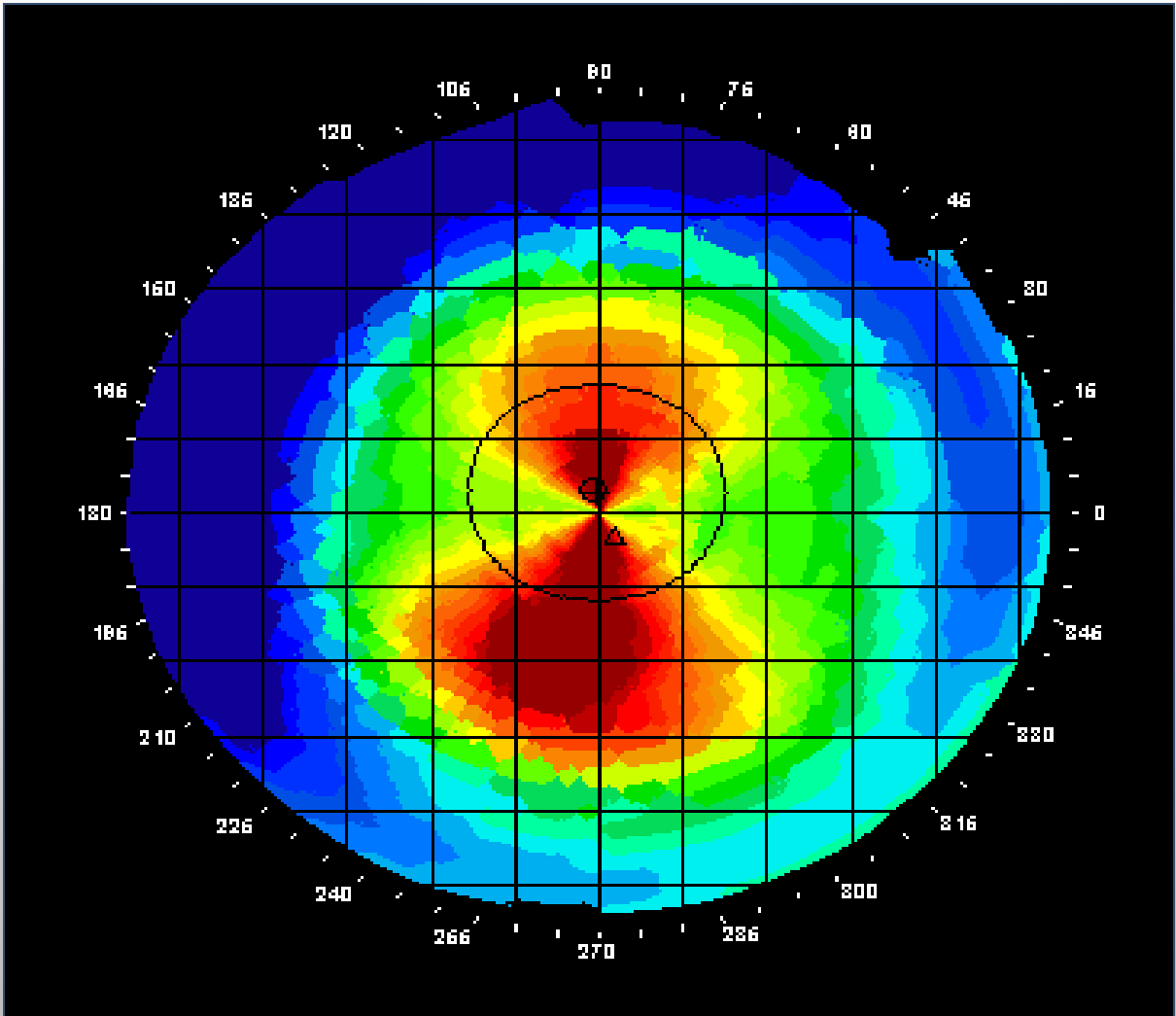
THE CORNEAL SURFACE

THE CORNEAL SURFACE

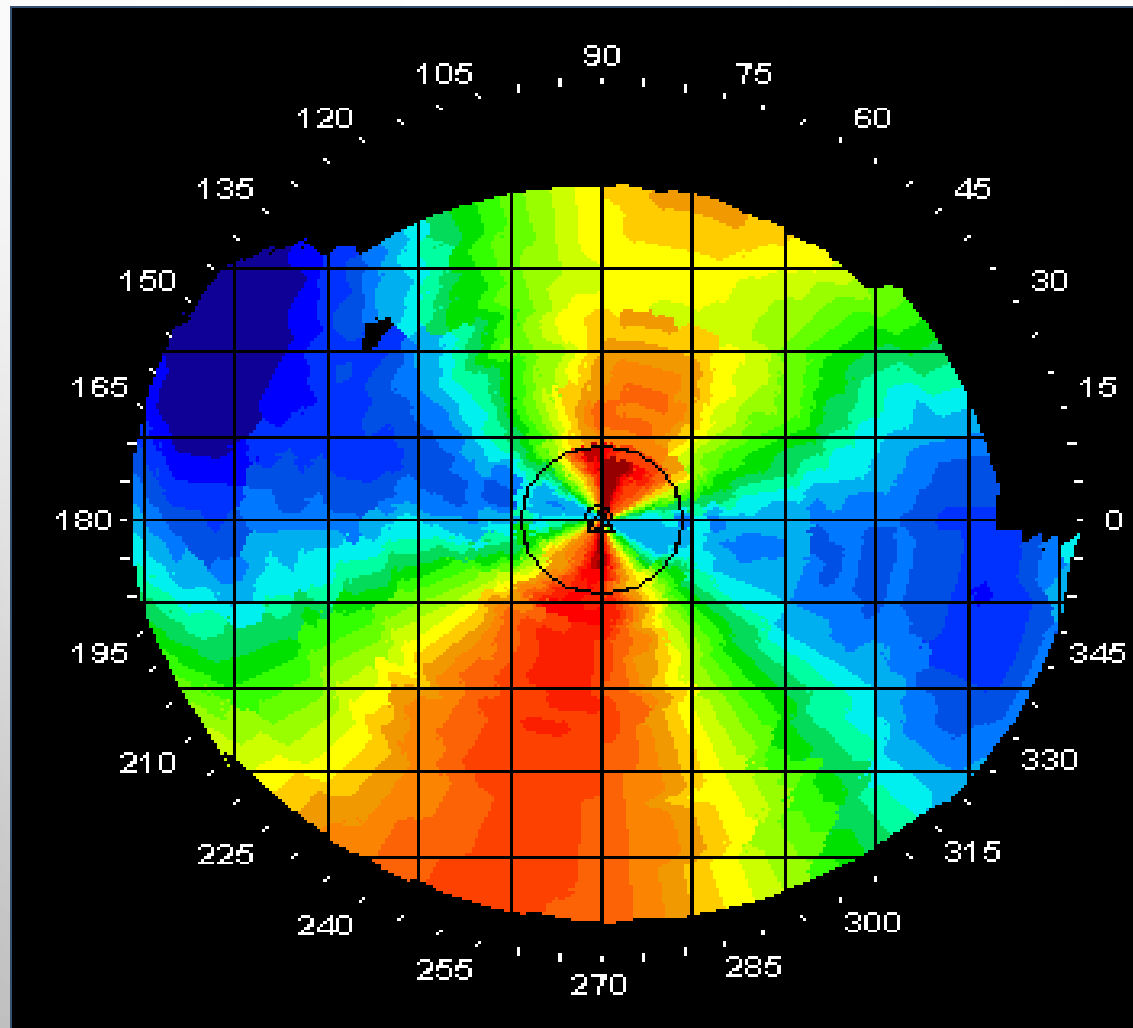
- CENTRAL TORICITY
- PERIPHERAL TORICITY



CENTRAL CORNEAL TORICITY



PERIPHERAL CORNEAL TORICITY



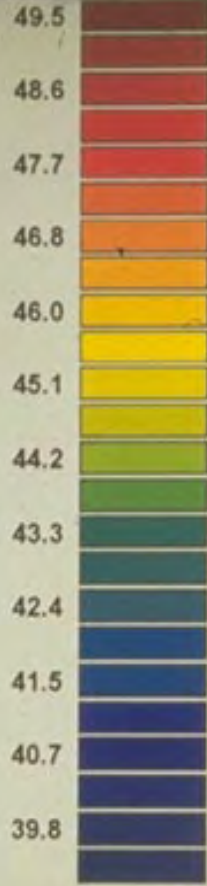
THE PROBLEM WITH THE KERATOMETER

- ASSUMES THE CORNEA IS ROUND
- ASSUMES ORTHOGONALITY
- MEASURES A SMALL AREA
- MEASURES ONLY FOUR POINTS
- ASSUMES A COMPENSATION FOR CORNEAL BACK SURFACE WHEN CALCULATING DIOPTERS OF CURVATURE

The background of the slide is a light gray gradient. It is decorated with several realistic water droplets of various sizes, scattered primarily in the top-left and bottom-right corners. The droplets have highlights and shadows, giving them a three-dimensional appearance.

A QUICK NOTE ABOUT KERATOCONUS

Casey Eye Institute **Corneal Power Map**

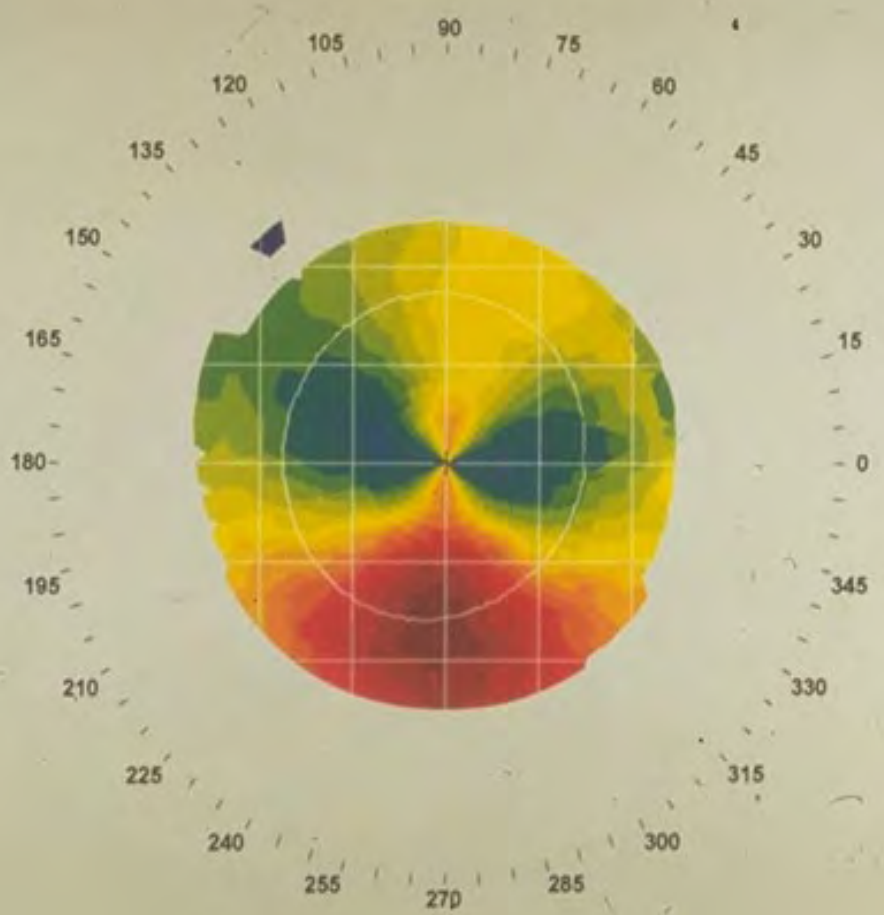


Patient:

Power: 44.7 D
Radius: 7.55 mm

From vertex:
Distance 0.00 mm
S-merid 0°

From pupil:
Distance 0.04 mm
S-merid 328°



Diopters

AutoSize

Options

ORC

Casey Eye Institute **Corneal Power Map**

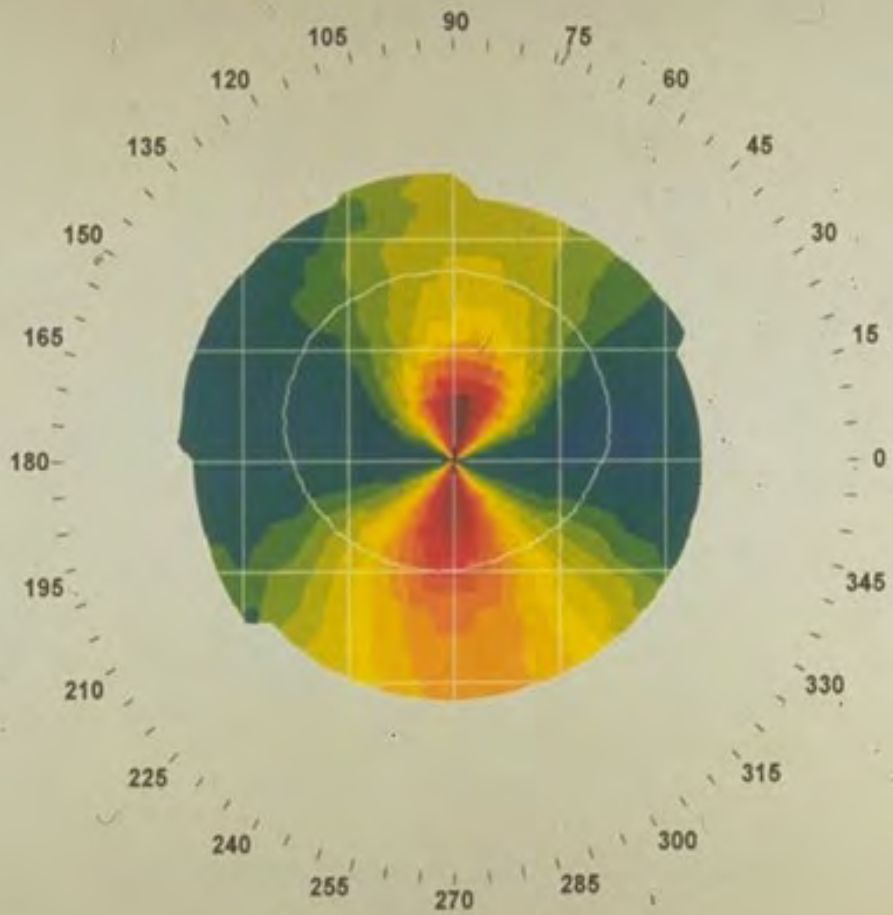
52.9
51.8
50.7
49.6
48.4
47.3
46.2
45.1
43.9
42.8
41.7
40.6

Patient:

Power: 49.0 D
Radius: 6.88 mm

From vertex:
Distance 0.00 mm
S-merid 0°

From pupil:
Distance 0.09 mm
S-merid 280°



Diopters

Custom

Options

ORC

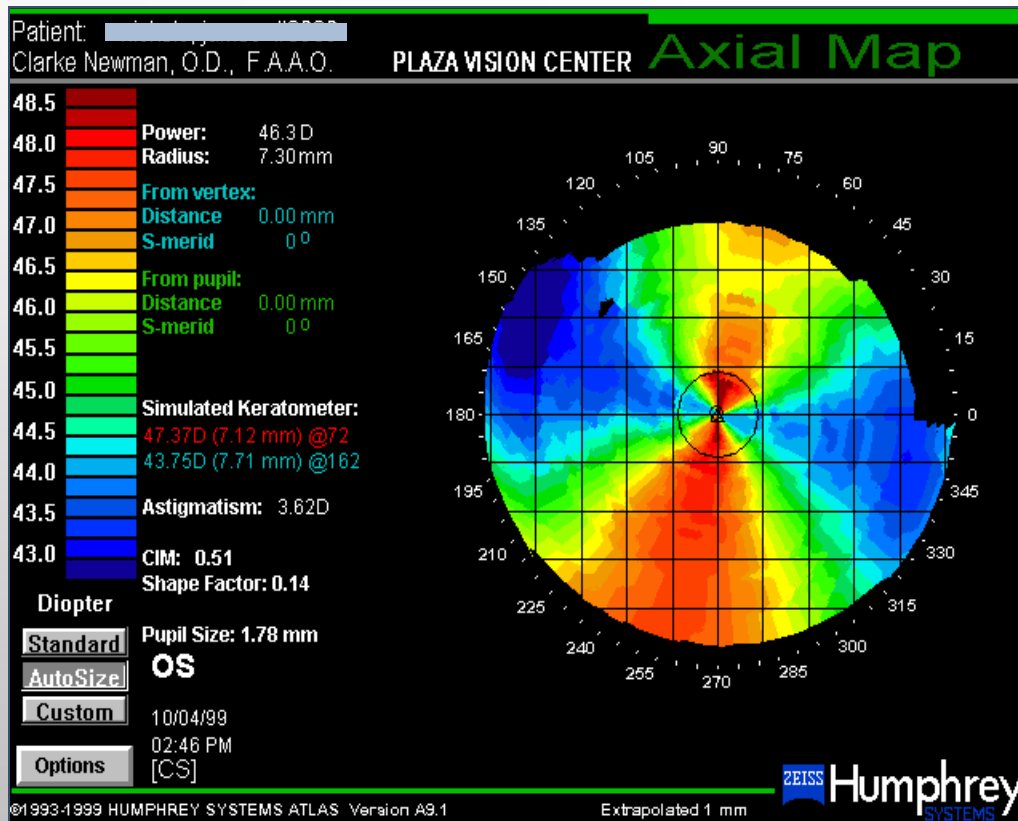
The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The text is centered in the middle of the slide.

USING THE CORNEAL TOPOGRAPHER TO DESIGN RGP LENSES

USING THE TOPOGRAPHER TO DESIGN RGP LENSES

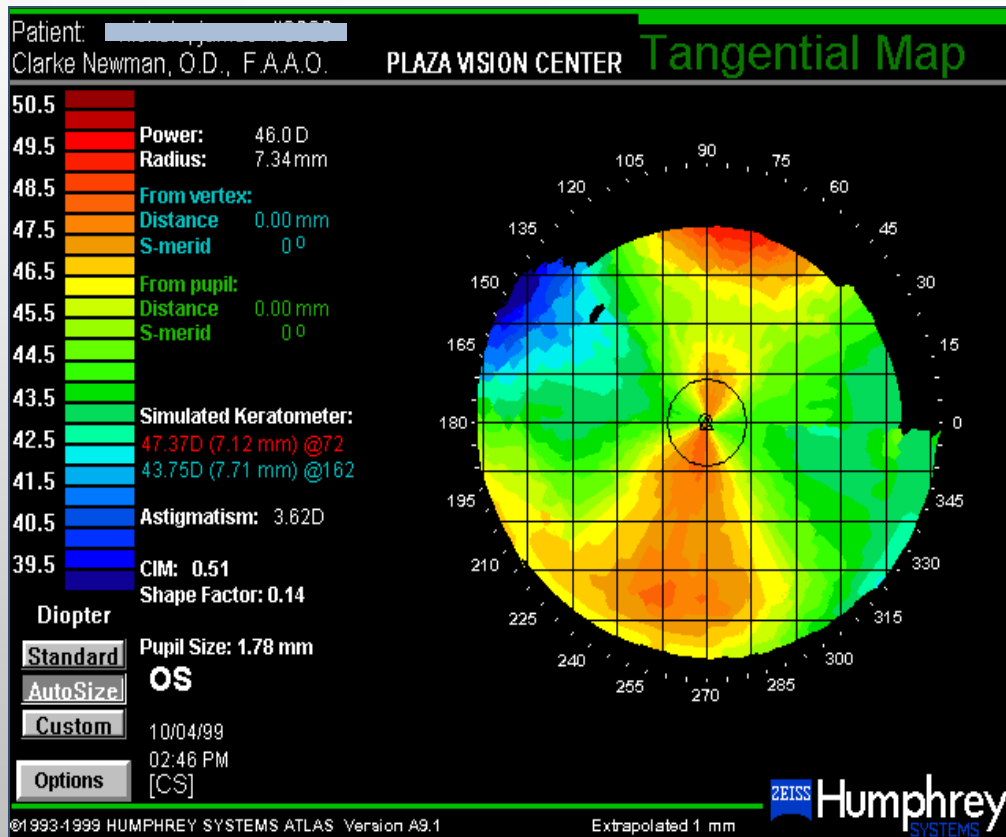
- USING THE DIOPTER OF CURVATURE PLOTS
 - AXIAL (SAGITTAL) MAP
 - TANGENTIAL (INSTANTANEOUS, MERIDIONAL) MAP
- REFRACTIVE (POWER) MAP: BEST FOR ESTIMATING THE CORNEA'S CONTRIBUTION TO THE TOTAL REFRACTIVE ASTIGMATISM
- THE OTHER USEFUL PLOTS
 - NUMERICAL VIEW
 - KERATOMETRY VIEW
- CONTACT LENS DESIGN MODULES
 - LENS DESIGN
 - FLUORESCEIN PATTERN SIMULATION

THE AXIAL MAP



- DIOPTERS OF CURVATURE
- NOT ACCURATE IN THE PERIPHERY
- MOST REPRODUCIBLE
- NOT BEST FOR LOCAL, SHARP CHANGES IN CURVATURE

THE TANGENTIAL MAP



- DIOPTERS OF CURVATURE
- MOST ACCURATE IN THE PERIPHERY
- LESS REPRODUCIBLE
- BEST FOR LOCAL, SHARP CHANGES IN CURVATURE

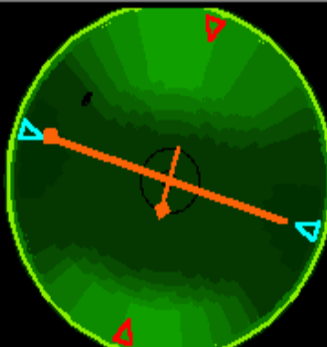
THE CONTACT LENS MODULES

Patient: **PLAZA VISION CENTER** **MasterFit™** Fluorescein View

Clarke Newman, O.D., F.A.A.O.

Show Details

92
84
76
68
60
52
44
36
28
20
12
4



Microns

Refraction - OS

Sphere Cyl Axis

-3.00 x -5.00 @ 161

Sim K Values

Flat: 43.75 D @162
7.71 mm
Steep: 47.37 D @72
7.12 mm

Shape

Factor: 0.14
Eccentricity: 0.37

Calculate Rx Over Rx Save Rx Fit Other Eye

Lens Design: Polymer Technology - Boston RXD

Fitting Method: Keratometric Topographic

Lens Calculations:

Base Curve 7.71 mm
43.75 D
Power -2.88

Base Curve 7.38 mm
45.75 D
Power -5.63

Lens Diameter 9.60 mm
Optical Zone 8.00 mm
Secondary Curve 8.71 mm
Width 0.40 mm
Peripheral Curve 9.71 mm
Width 0.50 mm

Lens Position From Vertex:
0.00 mm Temporal 0.03 mm Superior

100
80
60
40
20
252
162

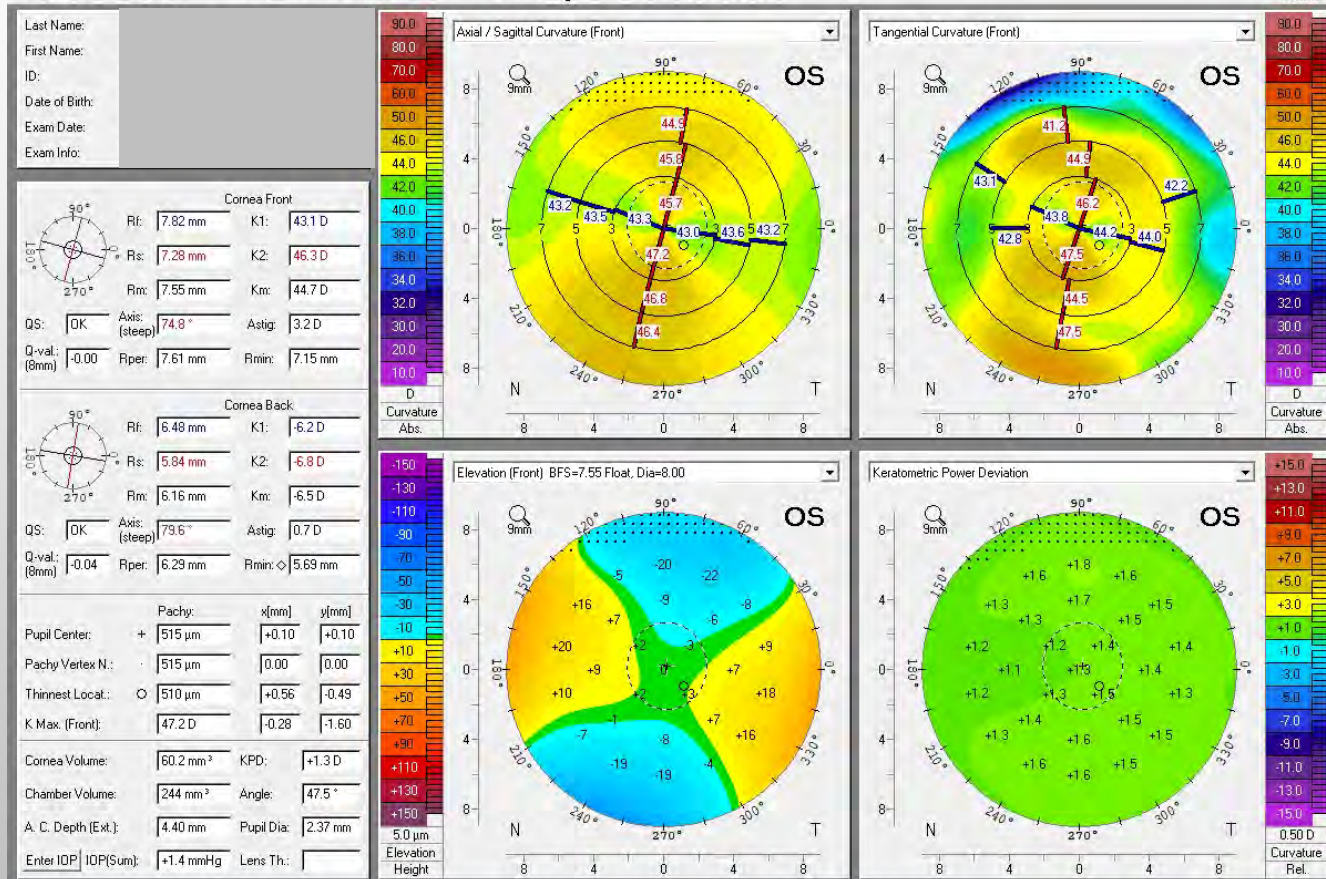
-5 -4 -3 -2 -1 0 1 2 3 4 5

Select Exam Worksheet
Axial Map Preferences
Options 10/04/99 02:46

©1993-1998 HUMPHREY SYSTEMS ATLAS Version A9 Extrapolated 1 mm ZEISS Humphrey SYSTEMS

PENTACAM[®] FOUR MAP SELECTABLE

OCULUS - PENTACAM 4 Maps Selectable



PENTACAM[®] LEN FITTING MODULE

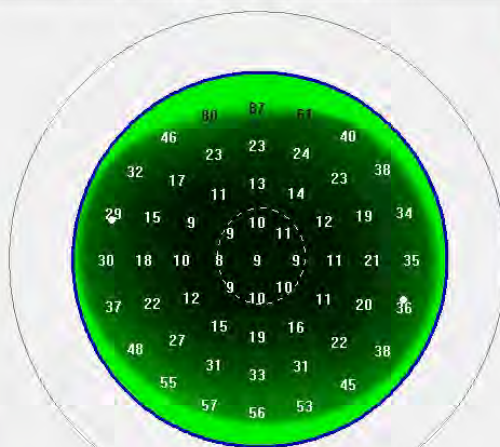
OCULUS - PENTACAM Contact Lens Fitting

1.28r07

Name:

D.o. Birth:

Lens: Appenz. EX AS RT / B r=7.85/7.45mm Ecc=0.50 D=9.80mm



Contact lens fitting

Manufacturer: Appenzeller Kontaktlinsen

Lens: Excellent AS RT / BT

r0(mm): 7.85

Ecc: 0.50

Tph.r0: 7.45

Ø(mm): 9.80

Suggestions:

Manu.	Lens	r0	Ecc	Ø
Appenz.	EX AS RT / B	7.85/7.45	0.50	9.80
Appenz.	EX MK RT / B	7.85/7.45	0.50	9.80
Falco	FIT	7.90/7.50	0.40	9.80
Galifa	ModulaART	7.85/7.45	0.50	9.80
Helych	Aktiv ITO	7.90/7.50	0.40	9.80
JenaLens	Jecl. RT/BT	7.80/7.40	0.60	9.80
PRECI	PRETI	7.90/7.50	0.40	9.90
TL	MA.AK	7.80/7.45	0.50	10.00
TL	MA.RT	7.90/7.50	0.40	10.00
TL	SPL.F.RT	7.90/7.55	0.30	10.00
TL	SPL.N.RT	7.90/7.55	0.20	10.00
JenaLens	Jac. SBT	7.90/7.50	0.20	9.80
JenaLens	Jecl. SRT	7.90/7.50	0.00	9.80
TL	MC.AK	7.90/7.55	0.00	10.00
TL	MC.RT	7.90/7.55	0.00	10.00
Appenz.	EX AS	7.80	0.40	9.80
Appenz.	EX MK	7.75	0.50	9.80
Falco	FAE	7.75	0.45	10.00
Falco	FAS	7.75	0.45	10.00
Galifa	ModulaA	7.80	0.40	9.80
Galifa	ModulaM	7.75	0.50	9.80

Calc fluo.

Display:

Eccentricity

Axial/Sagittal cur.

Fluo image

Position:

R/L(mm): 0.00

L/D(mm): 0.00


Incl(°): +15

Keratometer

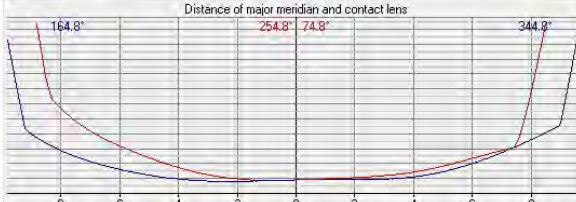
Rf: 7.82 mm

Rs: 7.28 mm

Q-val: (8mm) -0.00



Distance of major meridian and contact lens



CL power

Spect.: Sph=-0.00 Cyl=-0.00/0° cvd=0mm

C.lens: Sph=+0.00 Spherical

Oculus Optikgeräte GmbH
Münchholzhäuser Str. 29

35582 Wetzlar

Tel: (0641) 20 05-0
Fax: (0641) 20 05-255

www.oculus.de



THE CONTACT LENS MODULES?

- THE RESEARCH SHOWS THAT THESE MODULES IMPROVE THE SUCCESS OF THE NEOPHYTE PRACTITIONER
- ONLY TWO OF THE PROGRAMS ALLOW THE PRACTITIONER TO POSITION THE LENS ON THE EYE
- ONLY ONE ALLOWS THE PRACTITIONER TO ROCK THE LENS
- NONE OF THEM REALLY ALLOW THE PRACTITIONER TO MANIPULATE THE FRONT SURFACE

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The text is centered in the middle of the slide.

**THE POSTERIOR LENS
SURFACE:
A GEOMETRY PROBLEM**

THE POSTERIOR LENS SURFACE: A GEOMETRY PROBLEM

- BASE CURVE RADIUS SELECTION
 - SPHERICAL ISO-CURVE BASE (ISO-SPHERE)
 - WITH SPHERICAL OR ASPHERICAL PERIPHERY
 - ASPHERICAL ISO-CURVE (ISO-ASPHERE)
 - WITH SPHERICAL OR ASPHERICAL PERIPHERY
 - TORIC CURVE (EITHER SPHERICAL OR ASPHERICAL)
 - ISO-CURVE BASE / TORIC PERIPHERY
 - TORIC BASE / ISO-CURVE PERIPHERY
 - TORIC BASE / TORIC PERIPHERY

WHEN NOT TO USE A TORIC BASE

- WHEN THE CENTRAL CORNEAL TORICITY IS LESS THAN TWO DIOPTERS
- BEWARE WHEN THERE IS NO PERIPHERAL TORICITY

QUESTION: “WHY DOES AN ASPHERIC LENS WORK BETTER ON A TORIC CORNEA THAN A SPHERICAL LENS?”

- IT IS NOT URBAN MYTH
- AN ASPHERIC LENS HAS TWO DIFFERENT RADII AT ANY POINT THAT IS NON-APICAL
- HUH!?!

USING AN ISO-ASPHERE

- BECAUSE THE BENEFIT OF THE TANGENTIAL AND THE SAGITTAL RADII ARE ONLY PRESENT WHEN THE LENS DECENTERS, AND
- ONE ALWAYS WANTS VERTICAL DECENTRATION, AND NEVER HORIZONTAL DECENTRATION, THEN
- USING AN ISO-ASPHERE TO MASK CORNEAL TORICITY ONLY WORKS ON A WITH-THE-RULE CORNEA
- USE AN ISO-ASPHERE ON CORNEAS WITH LESS THAN TWO DIOPTERS OF CORNEAL TORICITY

TORIC CURVE ALIGNMENT

- SADDLE ALIGNMENT
 - BOTH PRINCIPLE MERIDIANS ARE ALIGNED
- LOW TORIC SIMULATION
 - ONE PRINCIPLE MERIDIAN IS ALIGNED AND THE OTHER IS FLATTER THAN THE CORNEAL CURVATURE
 - “YOU FIT THE FLATTEST CORNEAL MERIDIAN ‘ON K’, AND THE STEEPER CORNEAL MERIDIAN FLATTER THAN ‘K’”

TORIC CURVE ALIGNMENT

- SADDLE ALIGNMENT
 - BOTH PRINCIPLE MERIDIANS ARE ALIGNED
- LOW TORIC SIMULATION
 - ONE PRINCIPLE MERIDIAN IS ALIGNED AND THE OTHER IS FLATTER THAN THE CORNEAL CURVATURE
 - “YOU FIT THE FLATTEST CORNEAL MERIDIAN ‘ON K’, AND THE STEEPER CORNEAL MERIDIAN FLATTER THAN ‘K’”

TORIC CURVE ALIGNMENT

- SADDLE ALIGNMENT
 - BOTH PRINCIPLE MERIDIANS ARE ALIGNED
- LOW TORIC SIMULATION
 - ONE PRINCIPLE MERIDIAN IS ALIGNED AND THE OTHER IS FLATTER THAN THE CORNEAL CURVATURE
 - “YOU FIT THE FLATTEST CORNEAL MERIDIAN ‘ON K’, AND THE STEEPER CORNEAL MERIDIAN FLATTER THAN ‘K’”

QUESTION: "WHAT IS THE BEST CORNEAL TOPOGRAPHY FOR ALIGNING AN ISO-SPHERICAL RGP LENS?"

1. A SPHERICAL CORNEA
2. A WITH-THE-RULE CORNEA WITH 0.50 D OF CORNEAL TORICITY
3. A WITH-THE-RULE CORNEA WITH 1.00 D OF CORNEAL TORICITY
4. AN AGAINST-THE-RULE CORNEA WITH 0.50 D OF CORNEAL TORICITY
5. AN AGAINST-THE-RULE CORNEA WITH 1.00 D OF CORNEAL TORICITY
6. NONE OF THE ABOVE

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5. AN AGAINST-THE-RULE CORNEA WITH 1.00 D OF CORNEAL TORICITY
6. NONE OF THE ABOVE

NEW(ISH) THINKING IN IMPROVING GP LENS INITIAL COMFORT AND VISION

- PAT CAROLINE AND RANDY KOJIMA HAVE DONE SOME WORK THAT SUGGESTS THAT LARGER LENSES THAT HAVE TIGHTER PERIPHERAL CURVE, ESPECIALLY IN THE STEEP CHANNEL, IMPROVE INITIAL LENS COMFORT—OWING TO THE DECREASED LENS MOVEMENT
- RUTH CORNISH AND SILVIE SULAIMAN HAVE DONE RESEARCH THAT SUGGESTS THAT REDUCING LENS FLEXURE THROUGH INCREASED CENTER THICKNESSES, WHILE MAINTAINING THINNER EDGE THICKNESSES, REDUCED GP LENS DISCOMFORT

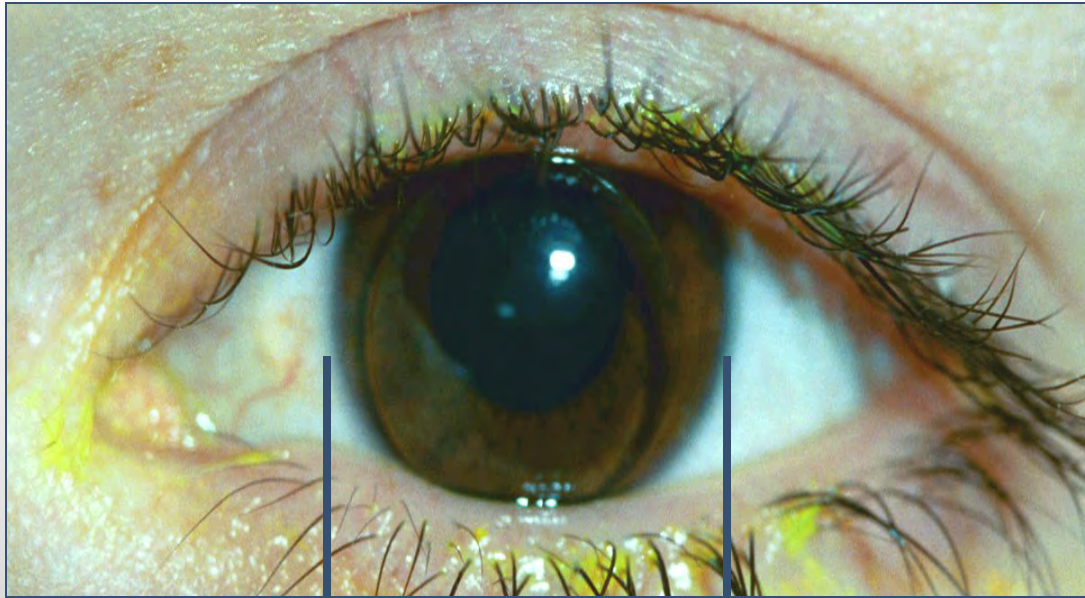
TAUTOLOGY

- PATIENTS WILL TOLERATE CONSTANT BLURRY VISION OVER VARIABLE VISION
- BLURRY LENSES ARE ALWAYS UNCOMFORTABLE—PATIENTS ARE SQUINTING THROUGH THE BLUR, AND THAT AFFECTS LID/LENS INTERACTIONS
- ALWAYS LISTEN FOR THE “LAST COMPLAINT”

THE ANATOMIC MEASUREMENTS

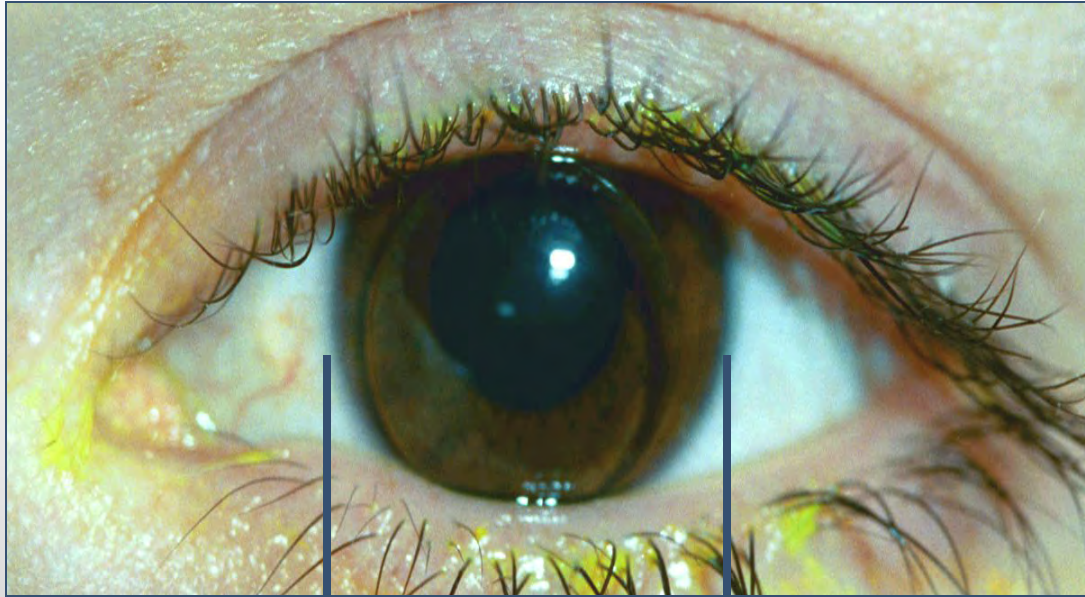


THE ANATOMIC MEASUREMENTS



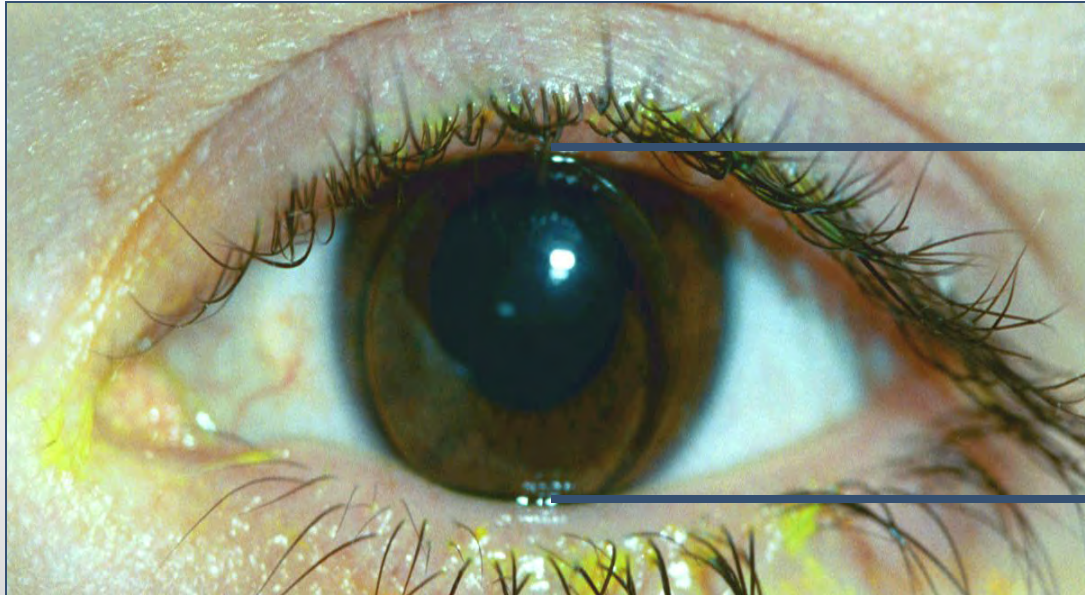
Horizontal
Visible Iris
Diameter

THE ANATOMIC MEASUREMENTS



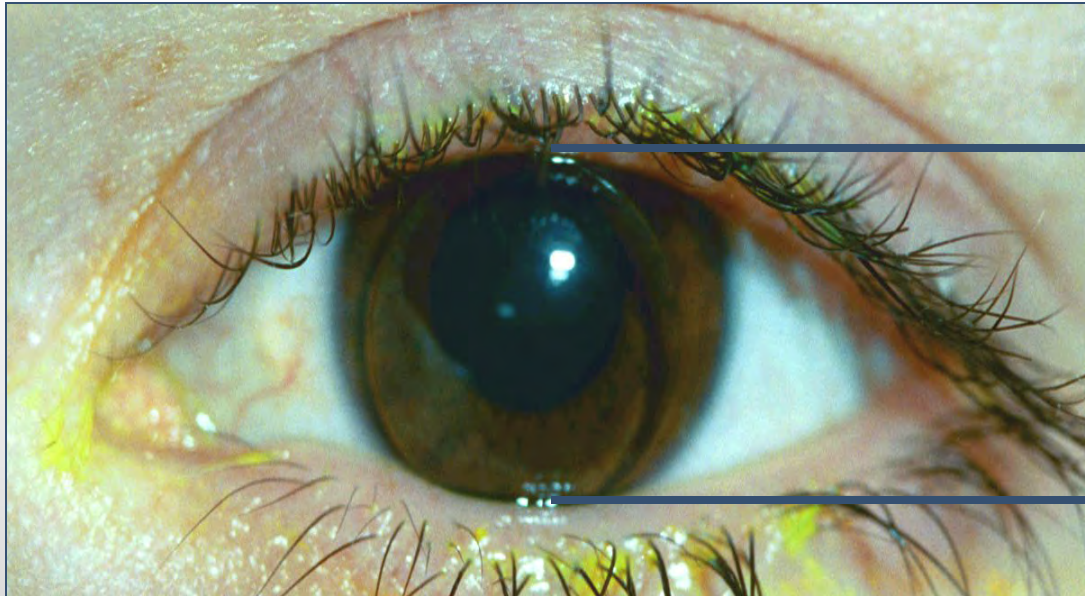
H.V.I.D.

THE ANATOMIC MEASUREMENTS



Vertical
Visible
Aperture

THE ANATOMIC MEASUREMENTS



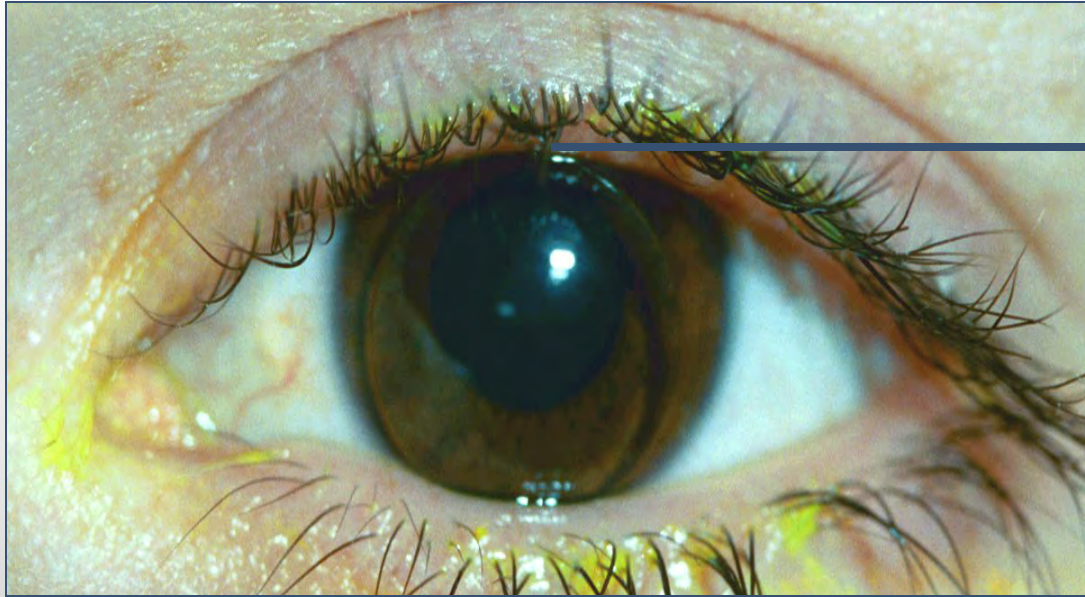
V.V.A.

THE ANATOMIC MEASUREMENTS



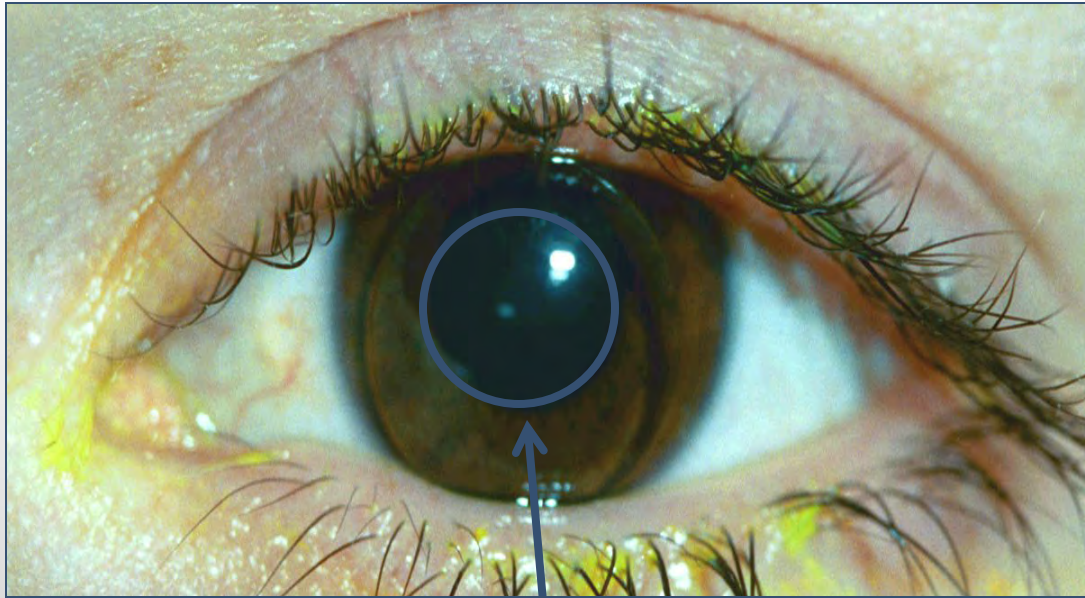
Inferior
Lid
Station

THE ANATOMIC MEASUREMENTS



Superior
Lid
Station

THE ANATOMIC MEASUREMENTS

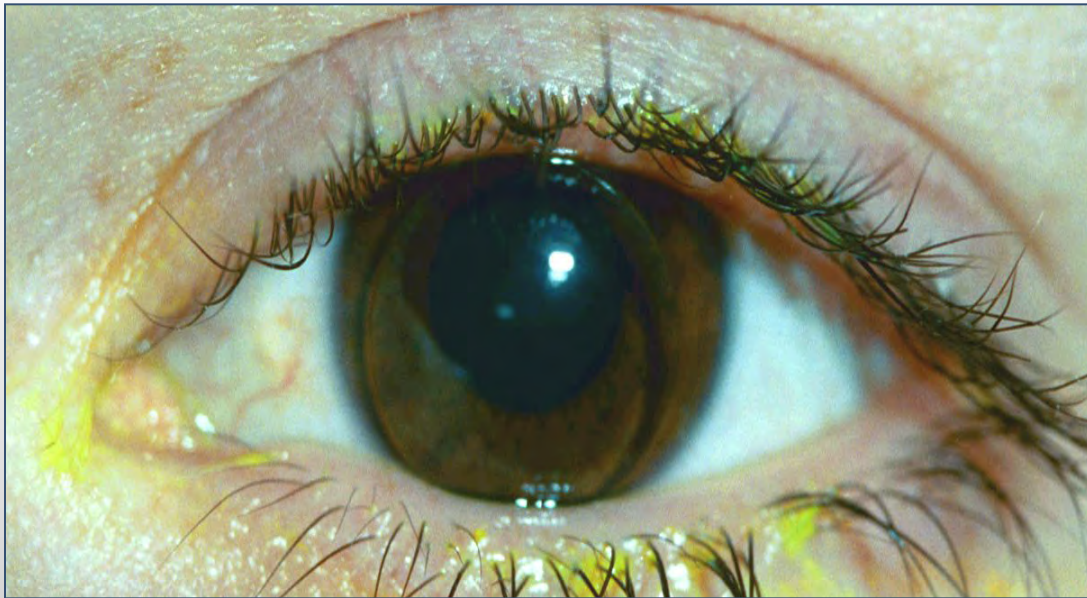


Scotopic and Photopic
Pupillary Diameters

AN EXAMPLE

- MANIFEST REFRACTION:
 - O.S.: - 3.00 / - 5.00 X 161
- MEASURED KERATOMETRY:
 - 43.75 (7.71 MM) @ 162 / 47.37 (7.12 MM) @ 072
- HORIZONTAL VISIBLE IRIS DIAMETER (H.V.I.D.):
 - 11.50 MM
- VISIBLE VERTICAL APERTURE (V.V.A.):
 - 9.00 MM
- SUPERIOR & INFERIOR LID STATIONS:
 - SUPERIOR: + 1.50 MM & INFERIOR: +1.00 MM
- PHOTOPIC & SCOTOPIC PUPILLARY DIAMETER:
 - PHOTOPIC: 3.50 MM & SCOTOPIC: 5.50 MM

ONE LAST LOOK AT THE EXAMPLE PATIENT



WHAT NUMBERS TO PICK

LENS PERAMETER SELECTION CHART					
H.V.I.D.	10.00 mm	10.50 mm	11.00 mm	11.50 mm	12.00 mm
O.A.D.	8.50 mm	8.80 mm	9.20 mm	9.60 mm	10.00 mm
P.O.Z.	7.10 mm	7.40 mm	7.70 mm	8.00 mm	8.40 mm
A.O.Z.	7.50 mm	7.80 mm	8.10 mm	8.40 mm	8.80 mm
HORIZONTAL FIT FACTOR	On K	0.25 Flat	0.50 Flat	0.75 Flat	1.00 Flat
VERTICAL FIT FACTOR	1.00 Flat	1.25 Flat	1.50 Flat	1.75 Flat	2.00 Flat

WHAT NUMBERS TO PICK



LENS PERAMETER SELECTION CHART					
H.V.I.D.	10.00 mm	10.50 mm	11.00 mm	11.50 mm	12.00 mm
O.A.D.	8.50 mm	8.80 mm	9.20 mm	9.60 mm	10.00 mm
P.O.Z.	7.10 mm	7.40 mm	7.70 mm	8.00 mm	8.40 mm
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HORIZONTAL FIT FACTOR	On K	0.25 Flat	0.50 Flat	0.75 Flat	1.00 Flat
VERTICAL FIT FACTOR	1.00 Flat	1.25 Flat	1.50 Flat	1.75 Flat	2.00 Flat

WHAT NUMBERS TO PICK

LENS PERAMETER SELECTION CHART					
H.V.I.D.	10.00 mm	10.50 mm	11.00 mm	11.50 mm	12.00 mm
O.A.D.	8.50 mm	8.80 mm	9.20 mm	9.60 mm	10.00 mm
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VERTICAL FIT FACTOR	1.00 Flat	1.25 Flat	1.50 Flat	1.75 Flat	2.00 Flat

WHAT NUMBERS TO PICK

LENS PERAMETER SELECTION CHART					
H.V.I.D.	10.00 mm	10.50 mm	11.00 mm	11.50 mm	12.00 mm
O.A.D.	8.50 mm	8.80 mm	9.20 mm	9.60 mm	10.00 mm
P.O.Z.	7.10 mm	7.40 mm	7.70 mm	8.00 mm	8.40 mm
A.O.Z.	7.50 mm	7.80 mm	8.10 mm	8.40 mm	8.80 mm
HORIZONTAL FIT FACTOR	On K	0.25 Flat	0.50 Flat	0.75 Flat	1.00 Flat
VERTICAL FIT FACTOR	1.00 Flat	1.25 Flat	1.50 Flat	1.75 Flat	2.00 Flat

CALCULATING THE BASE CURVES AND POWERS

- DETERMINE THE “HORIZONTAL KERATOMETRIC VALUE”
- SUBTRACT ALGEBRAICALLY THE HORIZONTAL FIT FACTOR AND CONVERT TO MILLIMETERS OF RADIUS FOR THE FINAL CONTACT LENS PRESCRIPTION
- IF THE SPECTACLE AXIS IS HORIZONTAL, THEN THE POWER IN THE HORIZONTAL MERIDIAN IS THE VERTEX CORRECTED SPHERE POWER
- IF THE SPECTACLE AXIS IS VERTICAL, THEN THE POWER IN THE HORIZONTAL MERIDIAN IS THE VERTEX CORRECTED SPHERE + CYLINDER POWER
- ADD ALGEBRAICALLY THE HORIZONTAL FIT FACTOR TO THE HORIZONTAL MERIDIAN POWER

CALCULATING THE BASE CURVES AND POWERS

- DETERMINE THE “VERTICAL KERATOMETRIC VALUE”
- SUBTRACT ALGEBRAICALLY THE VERTICAL FIT FACTOR AND CONVERT TO MILLIMETERS OF RADIUS FOR THE FINAL CONTACT LENS PRESCRIPTION
- IF THE SPECTACLE AXIS IS VERTICAL, THEN THE POWER IN THE VERTICAL MERIDIAN IS THE VERTEX CORRECTED SPHERE POWER
- IF THE SPECTACLE AXIS IS HORIZONTAL, THEN THE POWER IN THE VERTICAL MERIDIAN IS THE VERTEX CORRECTED SPHERE + CYLINDER POWER
- ADD ALGEBRAICALLY THE VERTICAL FIT FACTOR TO THE VERTICAL MERIDIAN POWER

LET'S USE OUR EXAMPLE...

- MANIFEST REFRACTION:
 - O.S.: - 3.00 / - 5.00 X 161
- MEASURED KERATOMETRY:
 - 43.75 (7.71 MM) @ 162 / 47.37 (7.12 MM) @ 072
- HORIZONTAL BASE CURVE & POWER:
 - 43.75 (7.71 MM) @ 162 & - 3.00 D
- APPLY THE HORIZONTAL FIT FACTOR (0.75 D)
 - 43.00 (7.84 MM) & - 2.25 D

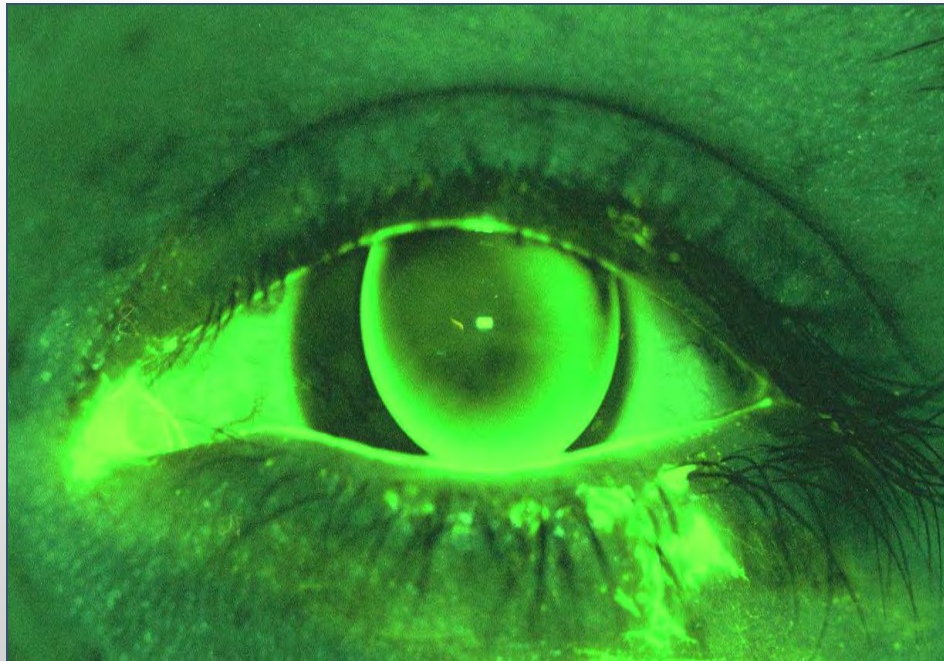
LET'S USE OUR EXAMPLE...

- MANIFEST REFRACTION:
 - O.S.: - 3.00 / - 5.00 X 161
- MEASURED KERATOMETRY:
 - 43.75 (7.71 MM) @ 162 / 47.37 (7.12 MM) @ 072
- VERTICAL BASE CURVE & POWER:
 - 47.37 (7.12 MM) @ 072 & - 8.00 D (- 7.25)
- APPLY THE VERTICAL FIT FACTOR (1.75 D)
 - 45.62 (7.39 MM) & - 5.50 D

LET'S USE OUR EXAMPLE...


- MANIFEST REFRACTION:
 - O.S.: - 3.00 / - 5.00 X 161
- MEASURED KERATOMETRY:
 - 43.75 (7.71 MM) @ 162 / 47.37 (7.12 MM) @ 072
- FINAL CONTACT LENS PRESCRIPTION:
 - 9.60 MM OVERALL DIAMETER (O.A.D.)
 - 8.00 MM POSTERIOR OPTIC ZONE DIAMETER (P.O.Z.)
 - 7.84 MM / - 2.25 D
 - 7.39 MM / - 5.50 D
 - SPECIFY “BACK VERTEX DRUM READINGS”

THE PATIENT'S ORIGINAL LENS



THE NEW LENS



The background features a light gray gradient with several realistic water droplets of various sizes scattered in the corners. The droplets have highlights and shadows, giving them a three-dimensional appearance.

OTHER WAYS TO IMPROVE TOUR TECHNIQUE

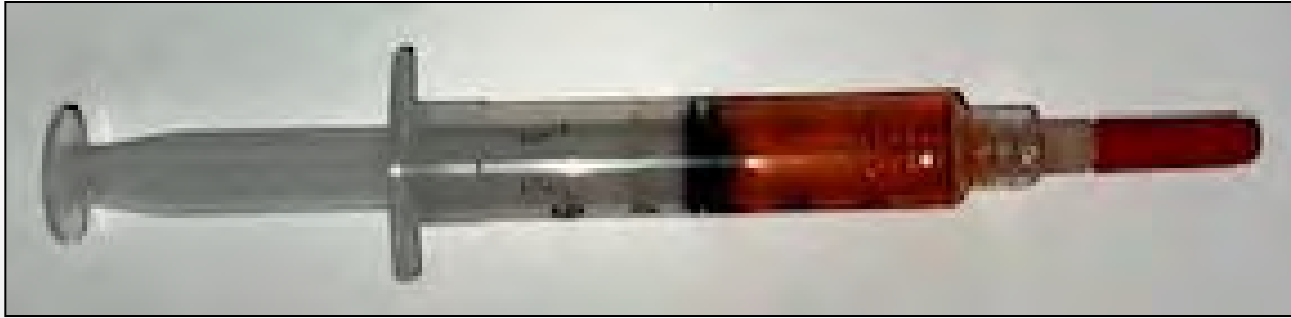
CREATING FLUORESCENCE WITH SODIUM FLUORESCEIN



CREATING FLUORESCENCE WITH SODIUM FLUORESCEIN



NEWMAN/SCARBOROUGH FLUORESCEIN SYSTEM

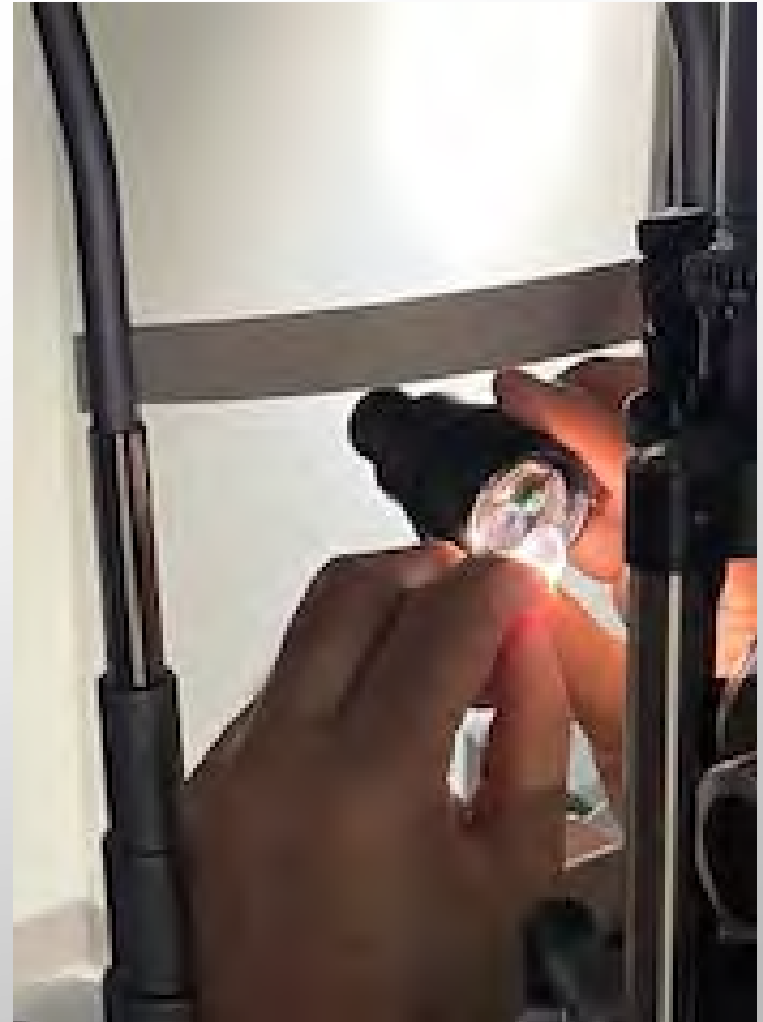


- 5 MM SYRINGE WITH LUER-LOC TIP
- MILLEX 22-MICRON LUER-LOC IN-LINE IV FILTER
- 0.75% SODIUM FLUORESCEIN COMPOUNDED IN STERILE BUFFERED SALINE
- FLUORESCEIN FLUORESCENCE AND QUENCHING IS HIGHLY DEPENDENT ON SOLUTION CONCENTRATION

LOOKING AT FLUORESCEIN PATTERNS

[HTTPS://GPLI.INFO/FLUORESCEIN-ID-GUIDE/](https://gpli.info/fluorescein-id-guide/)

USING YOUR SLIT LAMP BIOMICROSCOPE AS A SHADOWGRAPH



USING YOUR SLIT LAMP BIOMICROSCOPE AS A SHADOWGRAPH



USING YOUR SLIT LAMP BIOMICROSCOPE AS A SHADOWGRAPH



USING YOUR SLIT LAMP BIOMICROSCOPE AS A SHADOWGRAPH



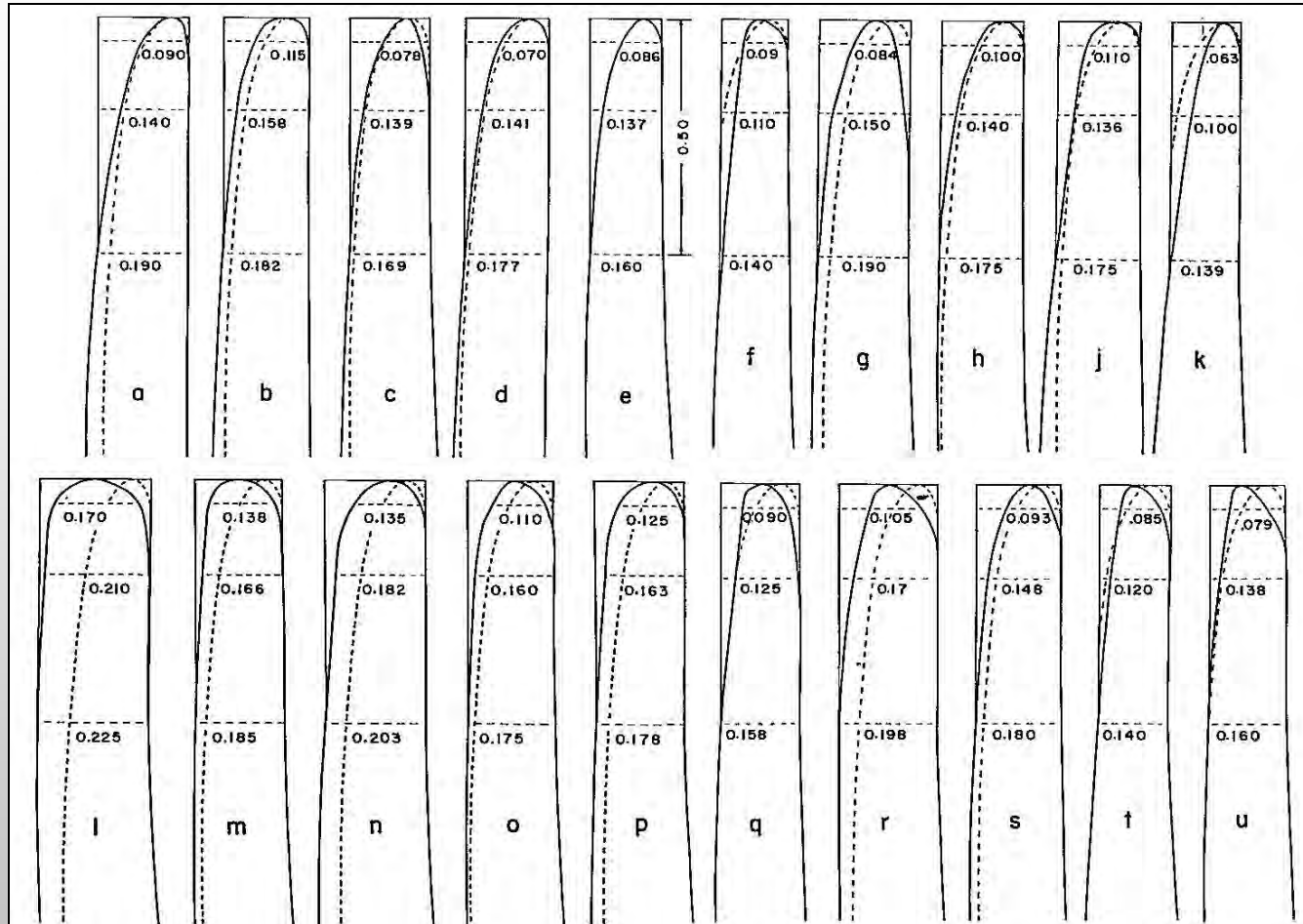
WHERE NOT TO EVALUATE CENTRATION, SEG HEIGHTS, AND MOVEMENT ROTATION

“Nobody walks around like this!”

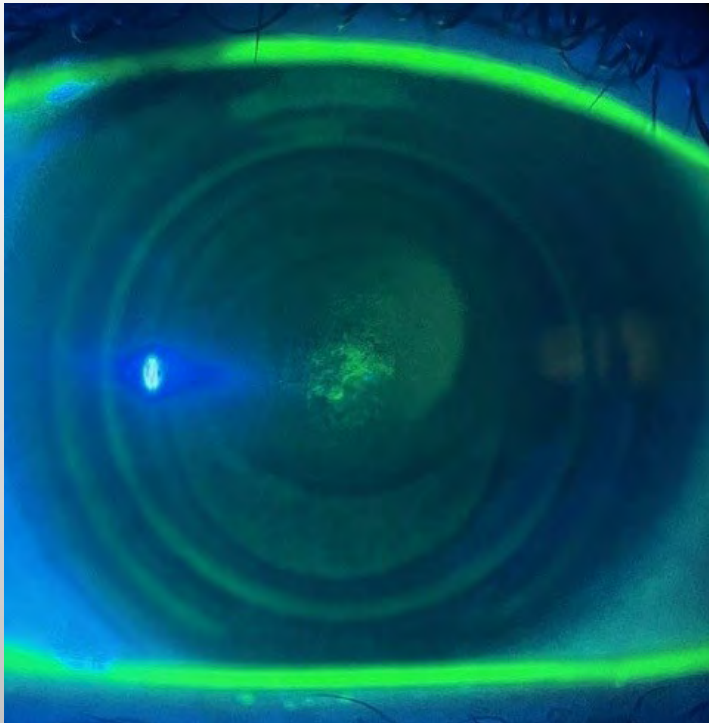
-Irv Borish



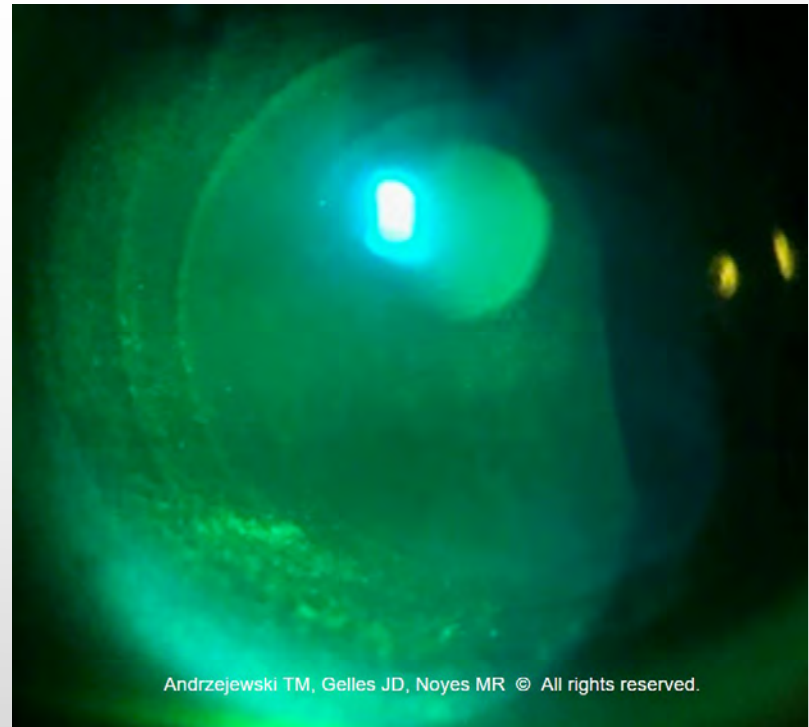
BETTER EDGE PROFILES



SIGNS OF POOR POSTERIOR LENS ALIGNMENT



Courtesy of Dr. Tiffany Adrzejewski



Courtesy of Drs. Tiffany Adrzejewski, John Gelles, and Marcus Noyes

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The text is centered in the middle of the slide.

WHAT ELSE IS NEW?

SPLINE CURVES

- A MATHEMATICAL EXPRESSION OF A CURVE THAT VARIES IN THREE DIMENSIONS INSTEAD OF TWO
- CREATED BY USING A CENTER POINT, POLAR COORDINATES, AND POINT MAGNITUDES
- THE FIRST BABY STEP TOWARDS SPLINE CURVE LENSES ARE NOW BECOMING AVAILABLE
 - THE ESSENTIAL™ MULTIFOCAL LENS
 - PRACTICALLY EVERY THIRD GENERATION OR NEWER PROGRESSIVE ADDITION SPECTACLE LENS
 - EVERY SCLERAL LENS
 - QUADRANT SPECIFIC LENSES LIKE A QUADRAKONE™

PERIPHERAL CURVES

- ISO-SPHERICAL PERIPHERAL CURVES
- ISO-ASPHERICAL PERIPHERAL CURVES
- TORIC PERIPHERAL CURVES
 - SPHERICAL
 - ASPHERICAL

WORDS TO LIVE BY

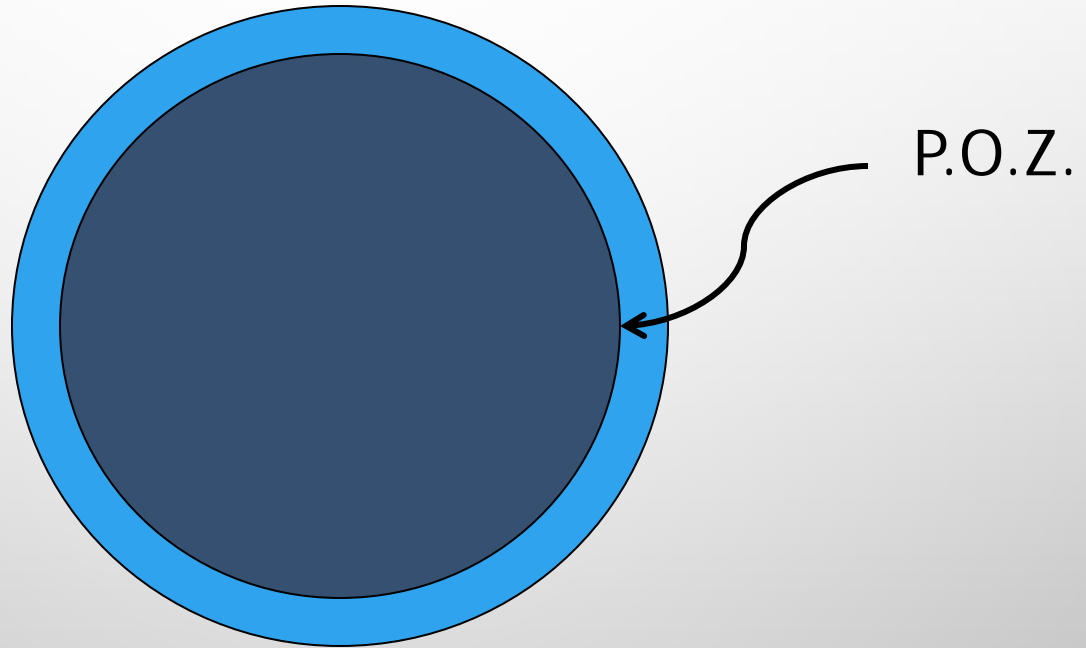
“Always Design Rigid Contact Lenses So That You Can Solve Problems By Removing Plastic”

-Dr. Irv Borish to an impressionable 4th year Optometry student one rainy day in 1986

PERIPHERAL CURVES

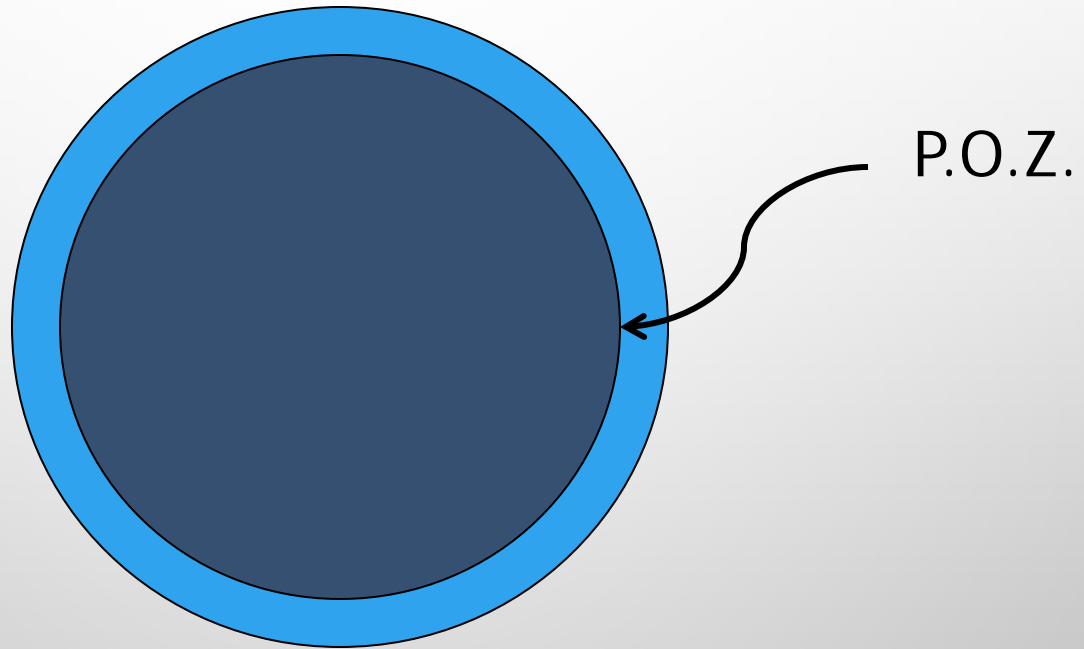
- ISO-CURVE BASE CURVE / TORIC PERIPHERAL CURVE
 - USE WHEN THE BASE CURVE ALIGNMENT OF AN ISO-SPHERE OR AND ISO-ASPHERE IS PROPER, BUT THE PERIPHERAL ALIGNMENT SHOWS EXCESSIVE BEARING IN ONE MERIDIAN, WHILE SHOWING EXCESSIVE CLEARANCE IN THE OTHER MERIDIAN
- TORIC BASE CURVE / ISO-CURVE PERIPHERAL CURVE
 - SOME LIKE THESE CURVES IN SADDLE ALIGNMENTS AND LOW TORIC SITUATIONS, BUT I THINK THAT THAT IS OLD THINKING

PERIPHERAL CURVES



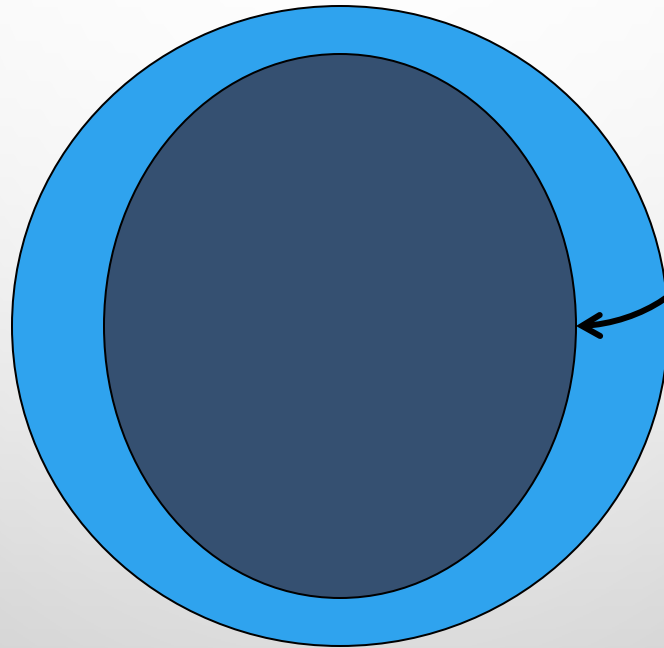
With a Toric Base
Curve and a Toric
Peripheral Curve
Set

PERIPHERAL CURVES



With an Iso-Curve Base Curve and an Iso-Curve Peripheral Curve Set

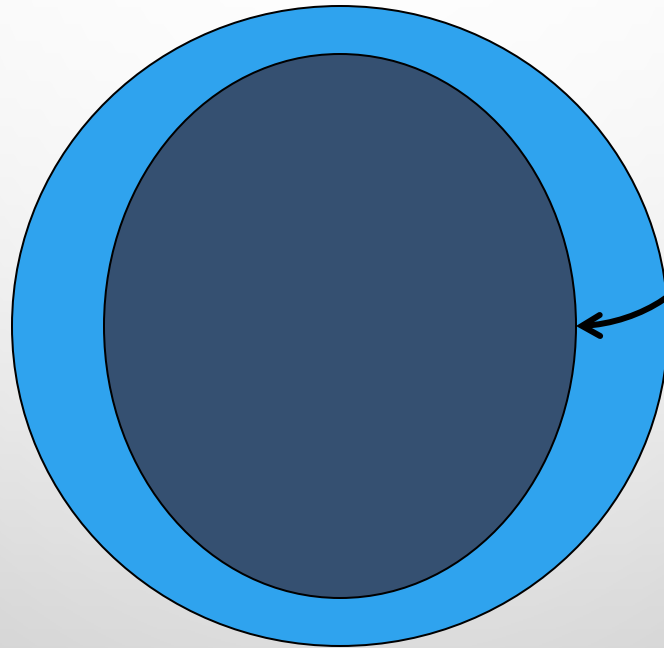
PERIPHERAL CURVES



P.O.Z.

With an Iso-
Curve Base Curve
and a Toric
Peripheral Curve
Set

PERIPHERAL CURVES



P.O.Z.

With a Toric Base
Curve and an
Iso-Curve
Peripheral Curve
Set

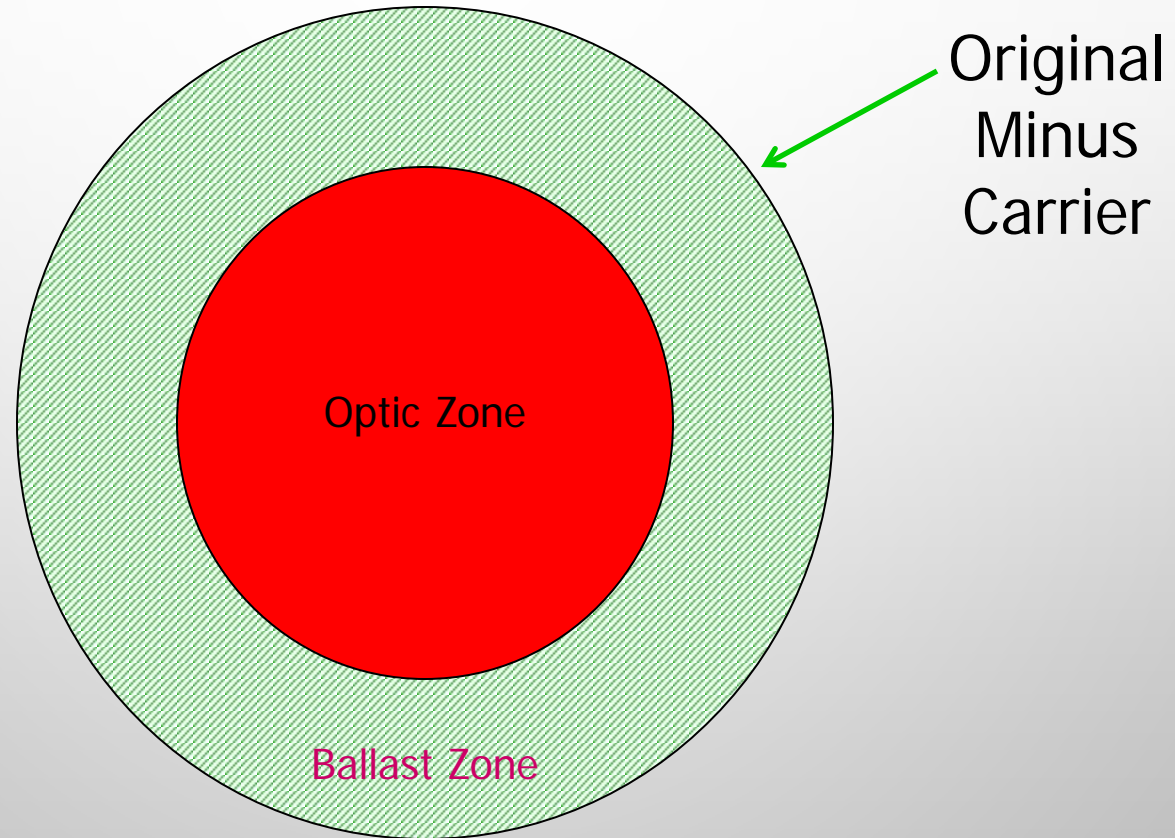
The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The text is centered in the middle of the slide.

**THE ANTERIOR LENS
SURFACE:
AN OPTICS PROBLEM**

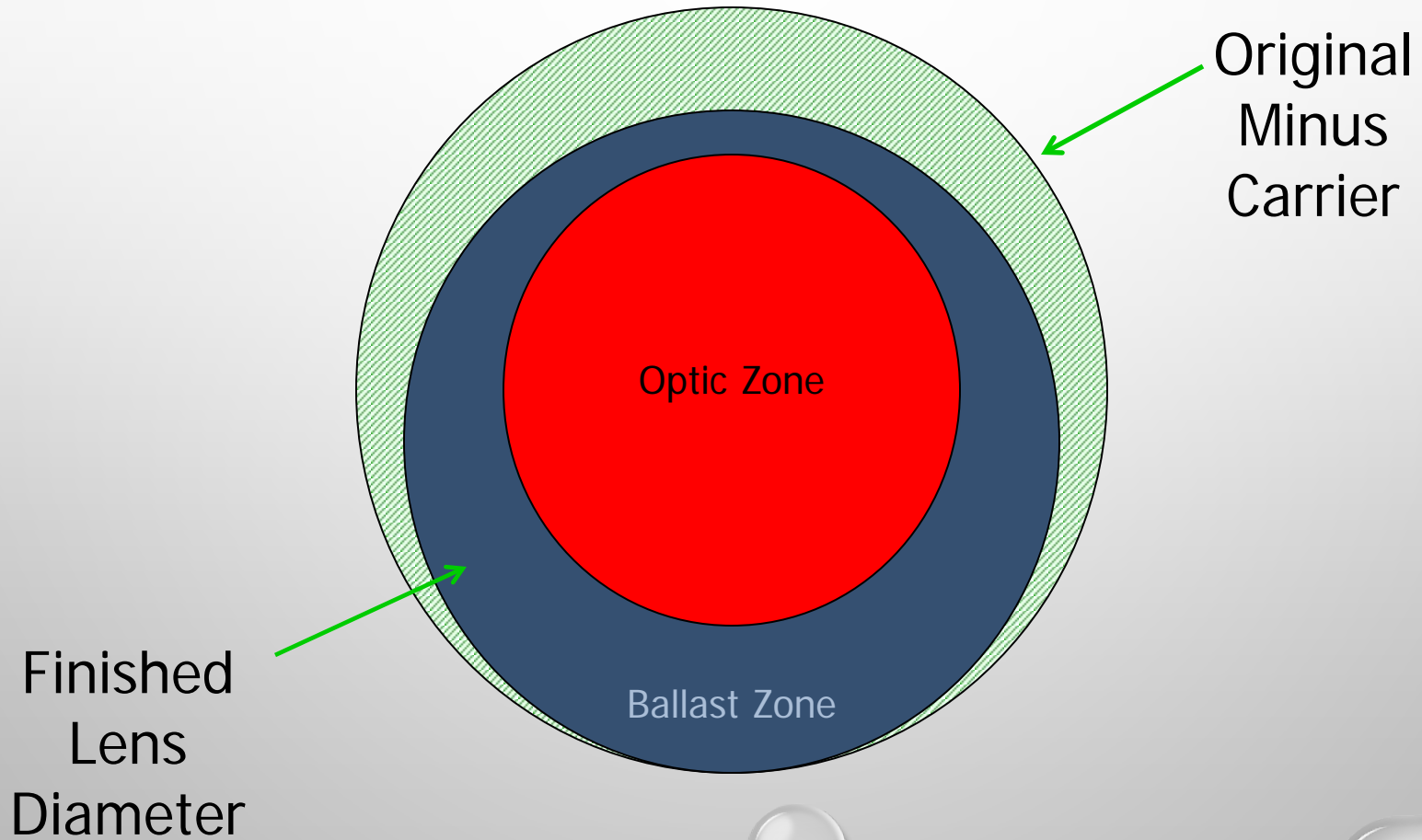
THE FRONT TORIC LENS

- INDICATED WHEN THE PATIENT HAS SIGNIFICANT (1.00 D, OR MORE) PHYSIOLOGICAL RESIDUAL ASTIGMATISM (P.R.A.), AND THE CORNEAL TORICITY IS LESS THAN TWO DIOPTERS
- USE LARGER LENS DIAMETERS (0.4 MM LARGER THAN NORMAL)
- DECENTER THE POSTERIOR OPTIC ZONE (P.O.Z.) SUPERIORLY 0.5 MM
- WHENEVER POSSIBLE, USE A PERIBALLASTED LENS DESIGN

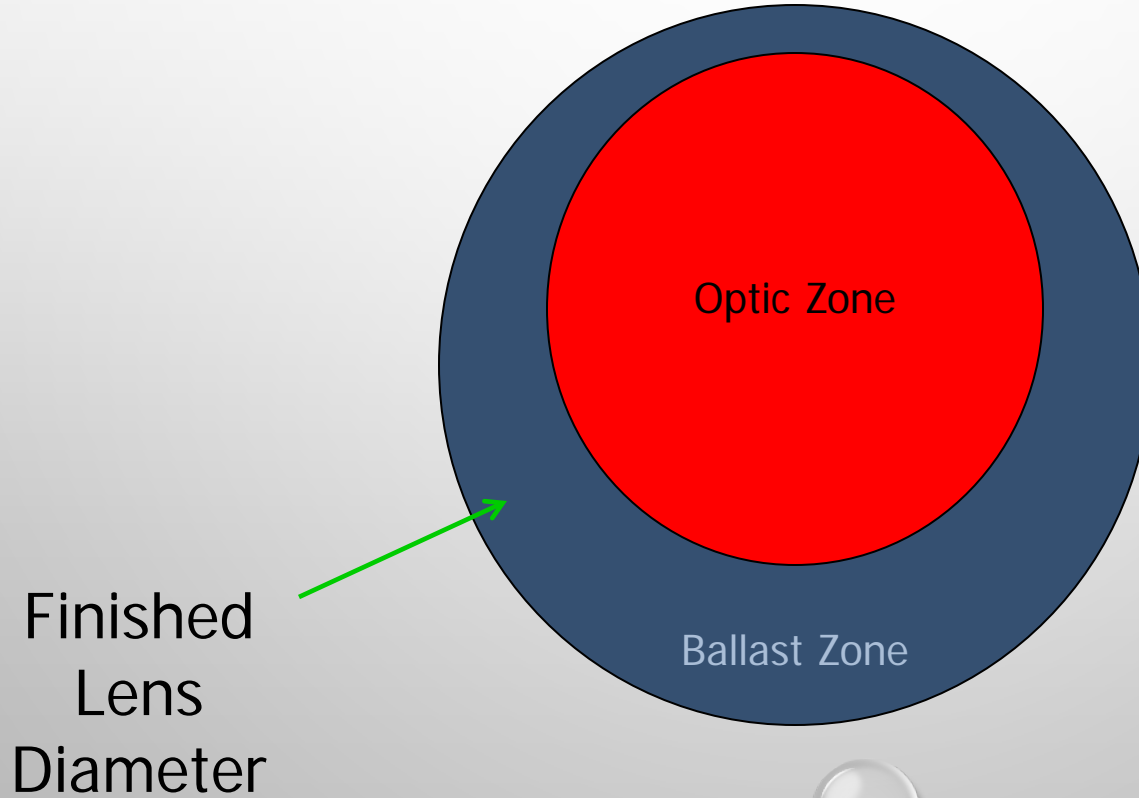
THE PERIBALLAST



THE PERIBALLAST



THE PERIBALLAST



THE PERIBALLAST

- THERE IS NO INDUCED VERTICAL PRISM
- THERE IS NO POWER CHANGE DUE TO THICKNESS CHANGES
(ABOUT 0.25 D PER 0.1 MM THICKNESS CHANGE)
- WITH AN ADDITIONAL, INFERIOR, OFFSET LENTICULAR ZONE,
A CONSTANT EDGE THICKNESS IS ACHIEVED
- DISADVANTAGE: INADEQUATE ROTATIONAL STABILITY

BALLASTS AND PERIBALLASTS: OTHER CONSIDERATIONS

- DURING A BLINK, THE LOWER LID ACTION IS TO MOVE NASALLY WHICH CAUSES THE BOTTOM OF THE LENS TO ROTATE NASALLY, THEREFORE
- ONE NEEDS TO ORDER THE PRISM ROTATED NASALLY (ABOUT 10° - 15°)
- ORDER ABOUT 2.0 PRISM DIOPTERS
 - MORE FOR HIGHER MINUS LENSES (- 4.00 D AND ABOVE)
 - LESS FOR PLUS LENSES
 - DECREASE PRISM FOR MATERIALS OF HIGHER SPECIFIC GRAVITIES AND INCREASE PRISM FOR MATERIALS OF LOWER SPECIFIC GRAVITIES

THE TORIC BASE / SPHERICAL FRONT LENS (BASE TORIC OR BACK TORIC)

- USEFUL ONLY WHEN THE T.R.A. IS ROUGHLY ONE-THIRD GREATER THAN THE ΔK (VARIES WITH THE LENS MATERIAL INDEX)
- DON'T WORRY ABOUT WHEN TO USE A BACK TORIC LENS WHEN ONE ELECTS TO USE A TORIC BACK SURFACE, DESIGN IN THE MANNER PREVIOUSLY DESCRIBED AND THE POWERS TAKE CARE OF THEMSELVES
- HOWEVER, ONE SHOULD REMEMBER THAT TORIC BACK SURFACES INDUCE RESIDUAL ASTIGMATISM (I.R.A.)

INDUCED RESIDUAL ASTIGMATISM

- BECAUSE THE INDEX OF REFRACTION OF THE TEAR FILM IS DIFFERENT FROM THE INDEX OF REFRACTION OF THE R.G.P. LENS MATERIAL, A TOROIDAL POSTERIOR SURFACE WILL INDUCE A SIGNIFICANT AMOUNT OF CYLINDER THAT MUST BE FACTORED INTO THE LENS POWER
- THIS INDUCED CYLINDER VARIES GREATLY WITH THE INDEX OF REFRACTION OF THE RGP LENS MATERIAL

INDUCED RESIDUAL ASTIGMATISM (CONTINUED)

- THE INDEX OF REFRACTION OF P.M.M.A. IS 1.49
- THE REALLY HIGH INDEX MATERIALS HAVE VANISHED
- A MID-RANGE INDEX WOULD BE 1.44 (E.G., BOSTON ESTM, FLOSITM, OPTIMUM INFINITETM, MENICON ZTM)
- A LOW INDEX OF REFRACTION WOULD BE 1.42 (E.G., BOSTON EOTM, BOSTON XO2TM)
- THE INDEX OF BOSTON XOTM IS 1.415 (THIS INDEX REPRESENTS A LOW WATER MARK)

THE CROSSED CYLINDER EFFECT (CCE) BITORIC LENS

- INDICATED WHEN AN ISO-CURVE LENS DEMONSTRATES POOR PHYSIOLOGICAL ALIGNMENT, AND THERE IS A SIGNIFICANT AMOUNT OF PHYSIOLOGICAL RESIDUAL ASTIGMATISM PRESENT, AND THE PRINCIPAL POWER MERIDIANS AND THE PRINCIPAL CURVATURE MERIDIANS ARE SIGNIFICANTLY MISALIGNED (USUALLY 15° OR MORE)
- THERE IS A STEP-BY-STEP GUIDE TO PRESCRIBING THESE LENSES AND DETERMINING THE POWER IN AIR IN THE HANDOUT
- ABSOLUTELY USE AN SPE BITORIC TRIAL SET
- MAKE SURE YOUR LAB KNOWS WHAT THEY ARE DOING!
- ONE CAN USE A BACK TORIC TRIAL SET, BUT IT IS A NIGHTMARE

The background of the slide is a light gray gradient. It is decorated with numerous water droplets of various sizes and shapes, scattered across the top and bottom edges. The droplets are rendered with realistic shading and highlights, giving them a three-dimensional appearance. The central text is in a bold, black, sans-serif font.

TROUBLE SHOOTING

TROUBLE SHOOTING

- GET THE BACK SURFACE GEOMETRY CORRECT BEFORE TRYING TO TACKLE POWER PROBLEMS
- CHECK AND CONTROL LENS ROTATION
- COMPENSATE FOR RESIDUAL ASTIGMATISM

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The word "CONCLUSION" is centered in the middle of the slide in a bold, black, sans-serif font.

CONCLUSION

CONCLUSION

- BE AGGRESSIVE ABOUT ALIGNING THE BACK SURFACE
 - THE NEW LENS FABRICATION TECHNOLOGIES FACILITATE THESE LENS DESIGNS
- BE CONFIDENT ABOUT CORRECTING RESIDUAL ASTIGMATISM
 - USE SPHERICAL POWER EFFECT LENSES WHENEVER POSSIBLE
- PROFIT FROM YOUR EXPERTISE
 - THESE ARE SPECIALTY LENSES—CHARGE ACCORDINGLY



THANK YOU!!

DRNEWMAN@DRNEWMAN.COM





Under the Lens: A Fresh Look at the Past, Present, and Future of Keratoconus

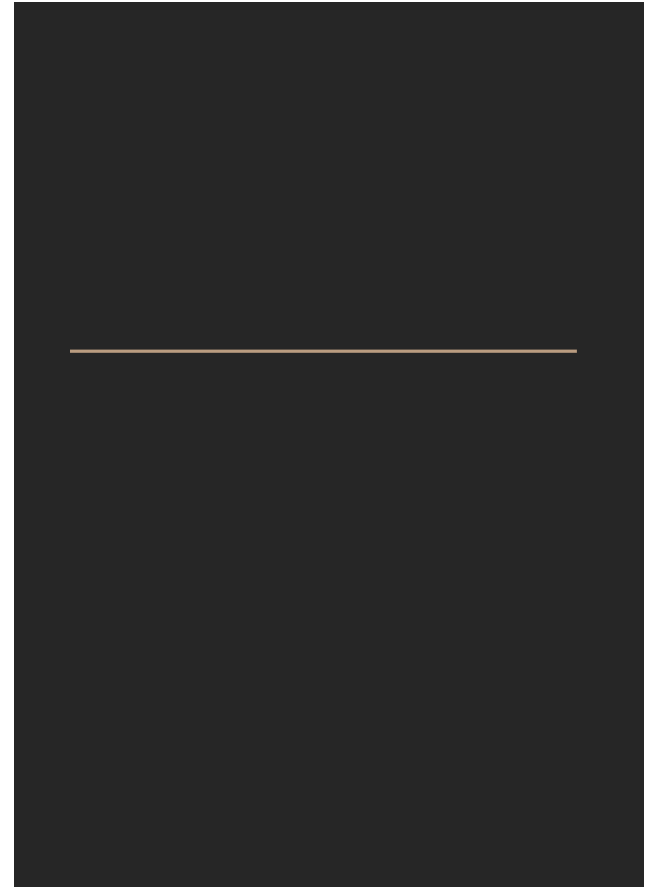
KAREN S DELOSS, OD, FAAO, FSLs

ASSOCIATE PROFESSOR

UNIVERSITY OF MICHIGAN, DEPARTMENT OF OPHTHALMOLOGY

ANN ARBOR, MICHIGAN

Nothing to disclose



Definition

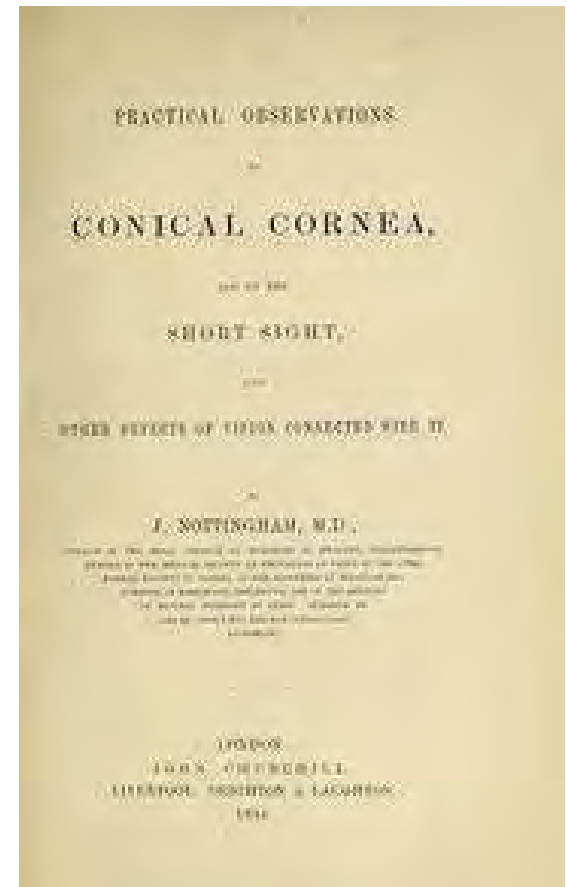
- Non-inflammatory thinning of corneal stroma resulting in a conical shape
- Keratoconus is a bilateral and asymmetric disease which results in progressive thinning and steeping of the cornea leading to irregular astigmatism and decreased visual acuity. Traditionally, the condition has been described as a noninflammatory disease; however, more recently it has been associated with ocular inflammation

John Nottingham -19th century

- Practical Observations on Conical Cornea
- “thinning and protrusion of the cornea, which results in a cone-like shape”
- Proposed the use of instruments like the keratoscope to study corneal curvature

Benedict Duddell – 18th century

- Irregular Astigmatism – alluding to keratoconus



Incidence

Historically: 1:2000

U.S. approximately 54.5 per 100,000 (lifetime 1:375)

Netherlands: 13.3 per 100,000

Saudi Arabia: 20 to 25 per 100,000 people annually

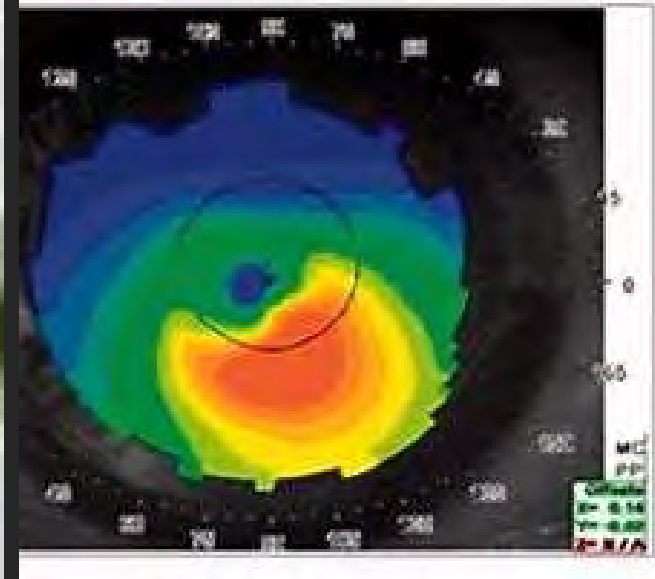
Israel: 3.18% among specific populations, such as Arab students

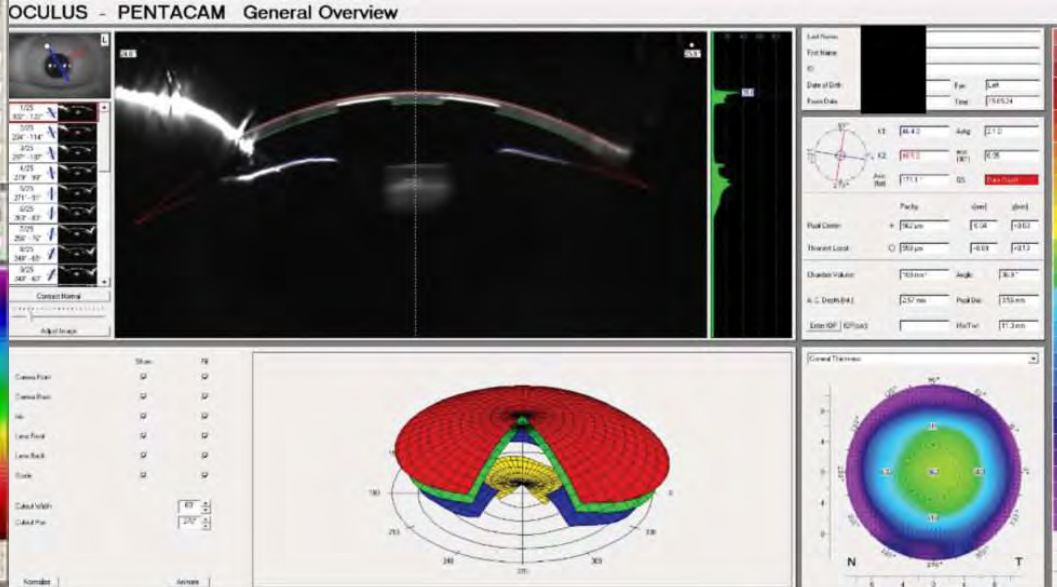
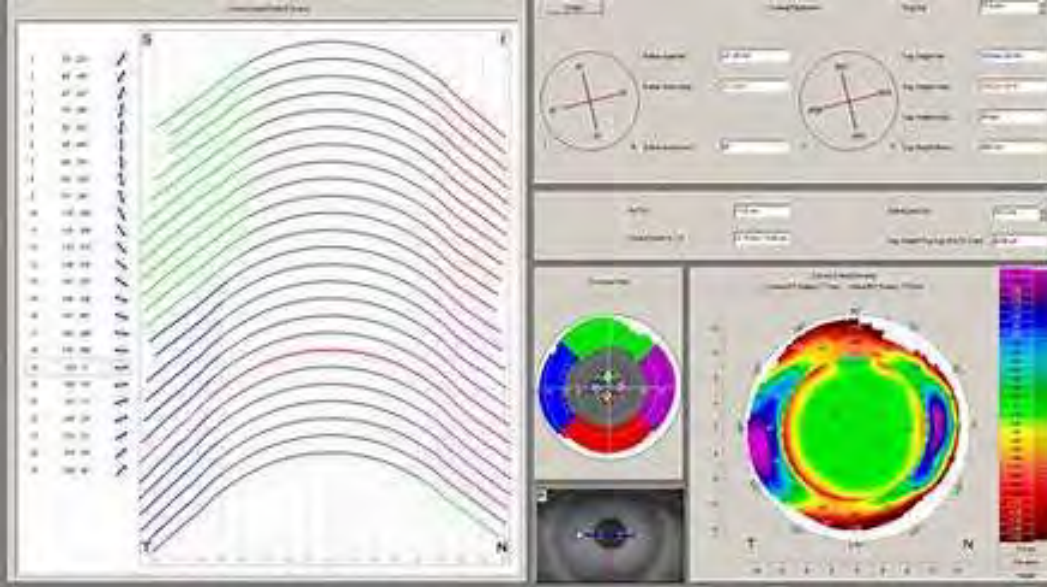
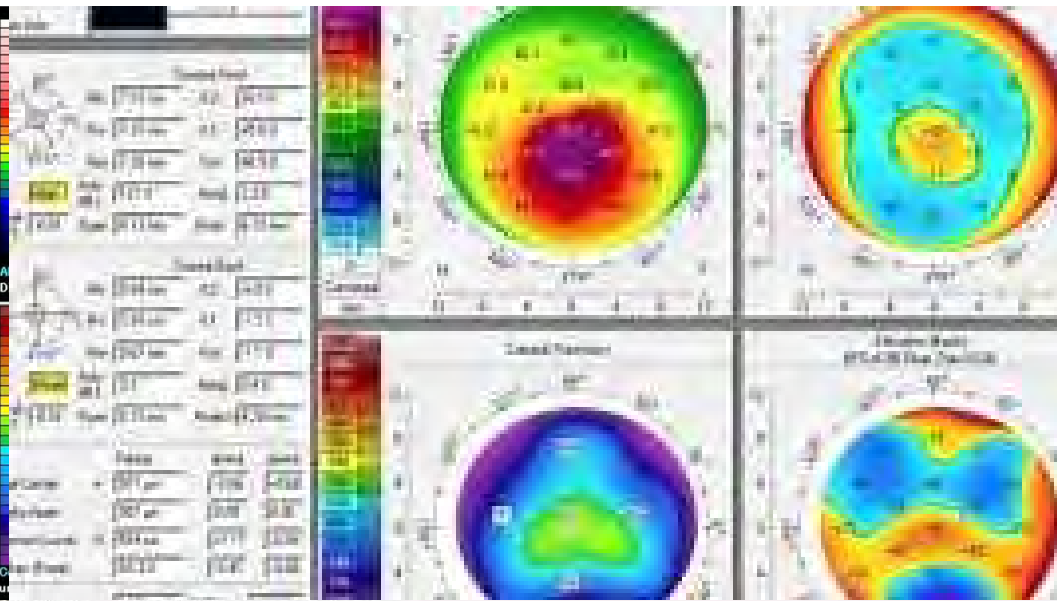
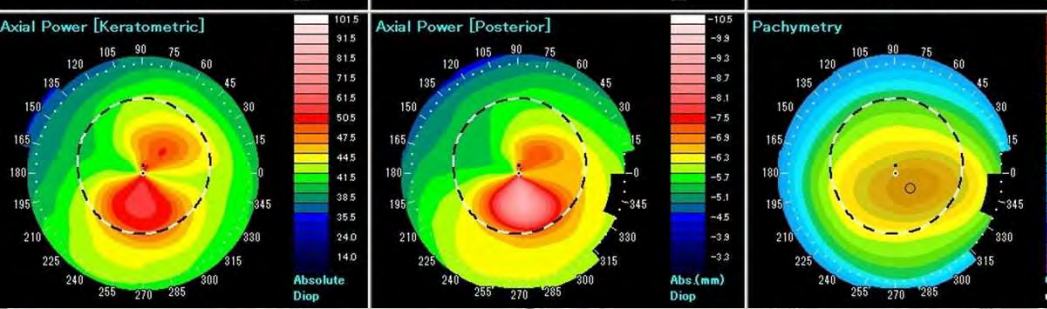
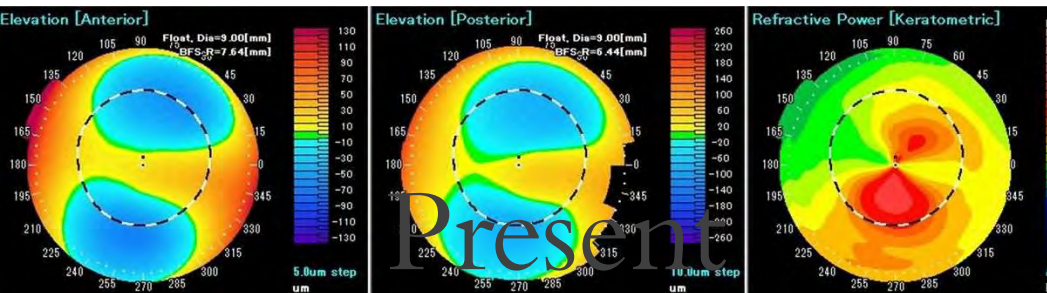
Iran: 20–25 per 100,000 annually

Meta Analysis: 50 and 230 per 100,000 individuals (138:100,00)

Black and Latino: 50% more likely than whites

Past





BELIN ABCD Progression Display

Grading System for POST CXL

Objective measurement for progression

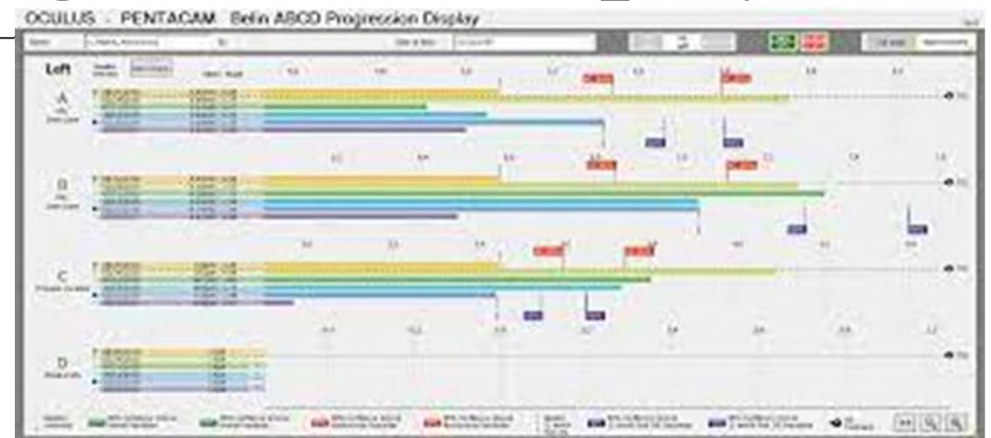
Utilizes central 3 mm –thinnest point

A –anterior surface

B – back surface

C – corneal thickness

D - 'distance' or BCVA



Treatment Options

Options

Soft Lens



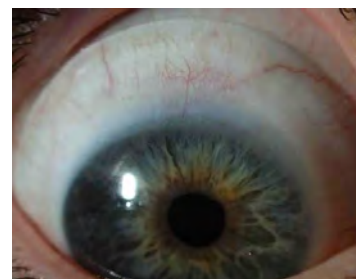
Corneal GP Lens



Hybrid Lens



Scleral Lens



Don't forget about glasses!!

Intrastromal Corneal Ring Segments

Intacs

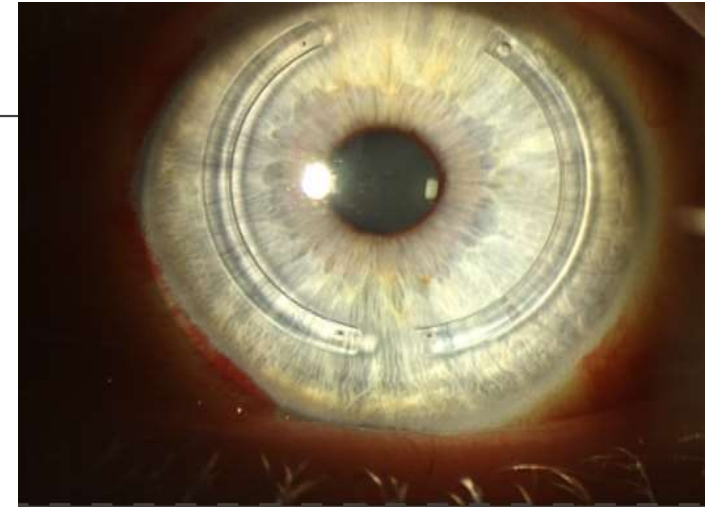
- Des Plaines, IL

Ferrara rings (KERARING)

- Belo Horizonte, Brazil

Mechanism

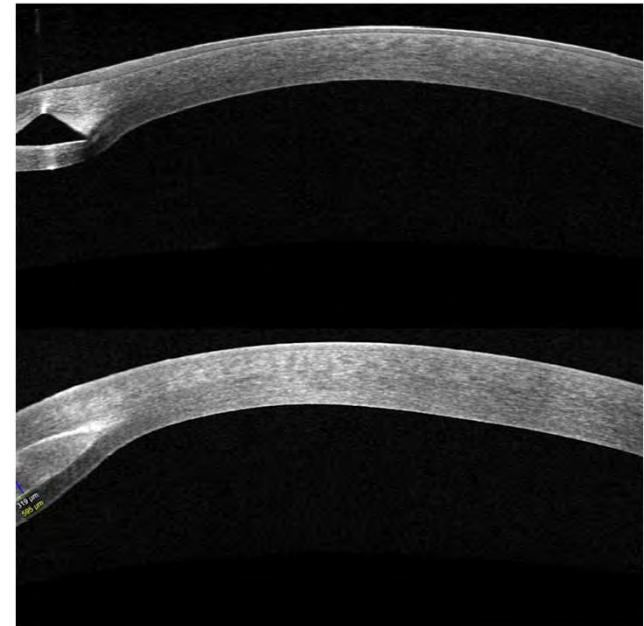
- Passive spacing elements
- Shorten arc length of anterior corneal surface
- Flattening of central cornea
- Provide biomechanical support for ectatic cornea



Corneal allogenic intrastromal ring segments (CAIRS)

- § Mid-peripheral intrastromal transplantation of donor cornea stromal segments
- § Donor corneoscleral rim is prepared by removing all epithelium and endothelium
- § Ring of donor stromal tissue that is cut into segments and transplanted into a circular mid-stromal mid-peripheral channel
- § Segment could also be precut by the eye bank and provided to the surgeon ready to insert
- § Less antigenic than DALK
- § Sutureless procedure.
- § Decreased surface issues

less corneal nerves cut



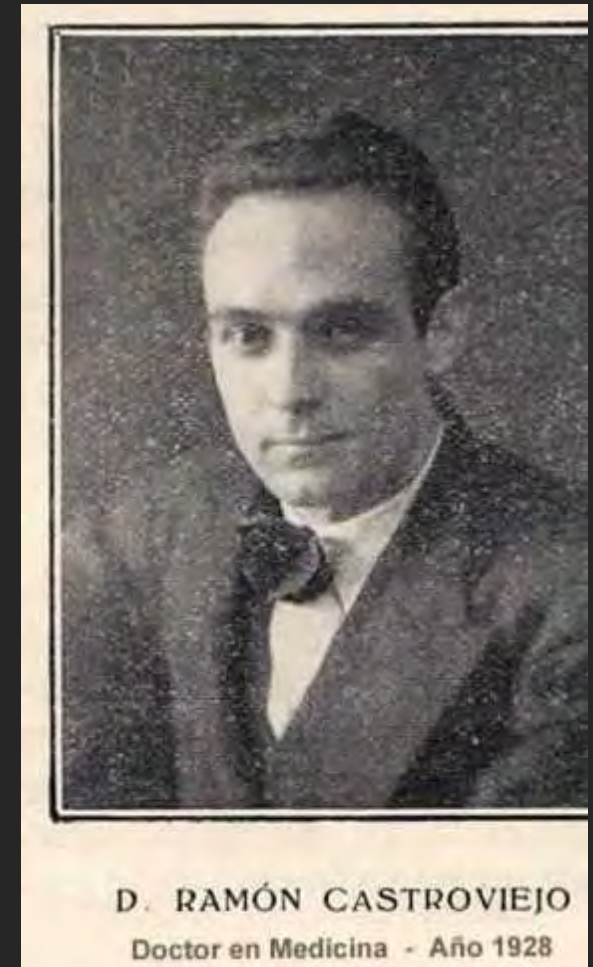
Penetrating Keratoplasty

The cornea was the first solid tissue to be transplanted successfully

1905: Eduard Zirm, performed the world's first corneal transplant, restoring the sight of a man who had been blinded in an accident

1931: Vladimir Filatov successfully transplanted corneal tissue from a deceased person

1936: Ramon Castroviejo reported the first successful corneal transplant to improve vision



Penetrating Keratoplasty

Full thickness corneal transplant

Open-sky procedure

Risks:

- Suprachoroidal hemorrhage
- Total prolapse

Postoperative PKP risks

- Retinal detachment
- Endophthalmitis
- Glaucoma
- Cataract
- Graft dehiscence
- Graft failure
- Graft rejection



Deep Anterior Lamellar Keratoplasty

Replacement of Stroma while maintaining host Descemet and endothelium

Faster visual recovery

Faster wound recovery

Less risk of endothelial cell loss

Sutures are still required

Femtosecond LASER assisted

First Ophthalmic FS laser system was designed by Dr Juhsaz in collaboration with Dr Kurtz at the University of Michigan in the early 1990s

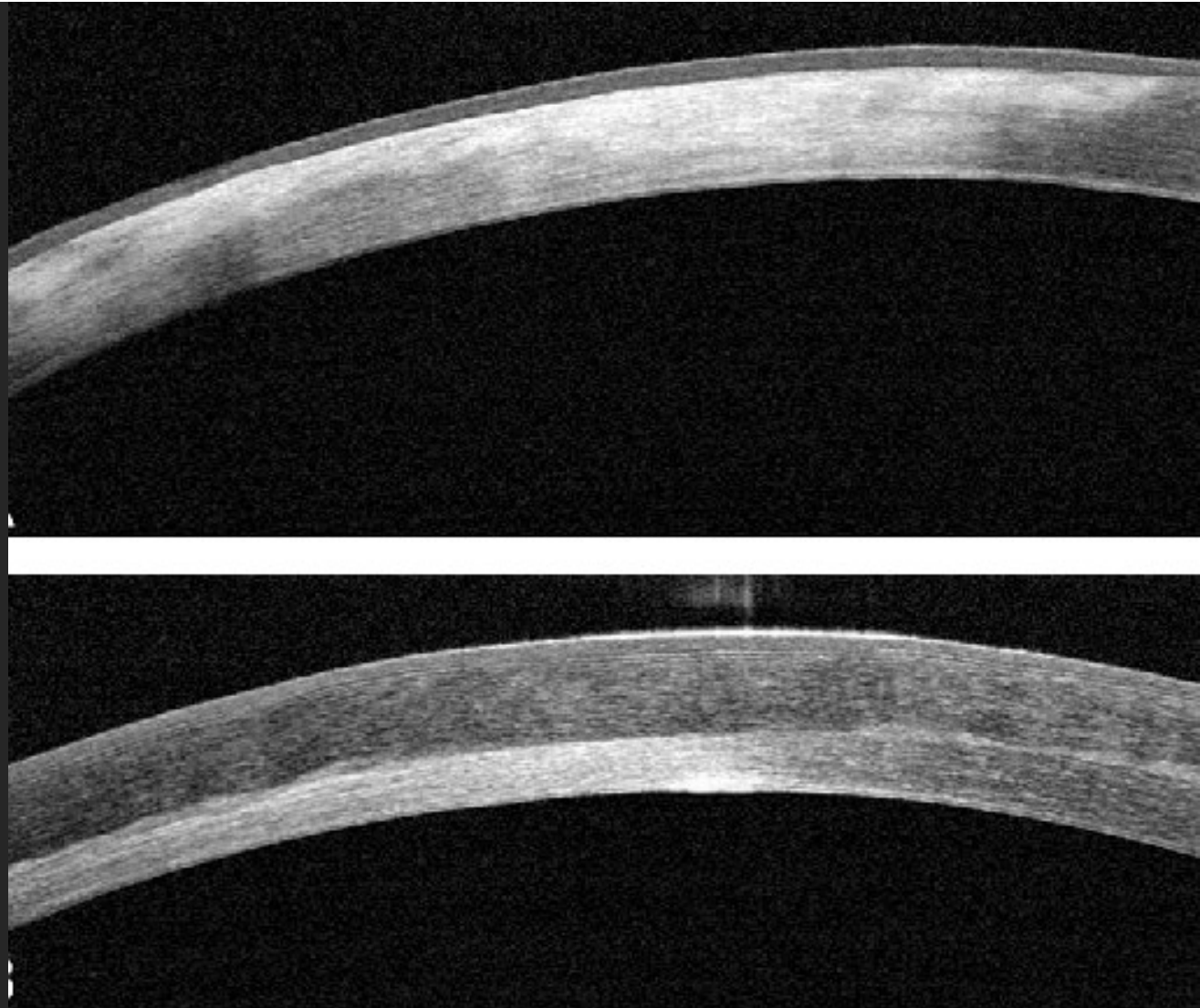
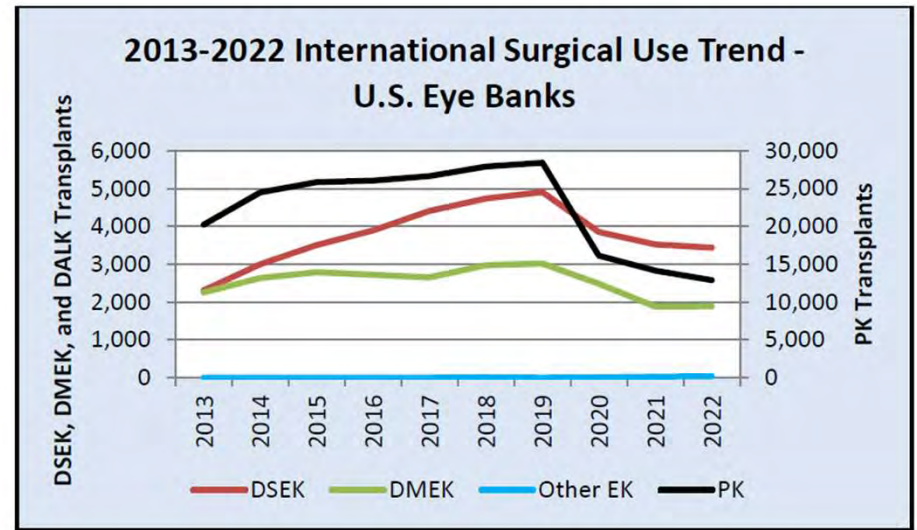
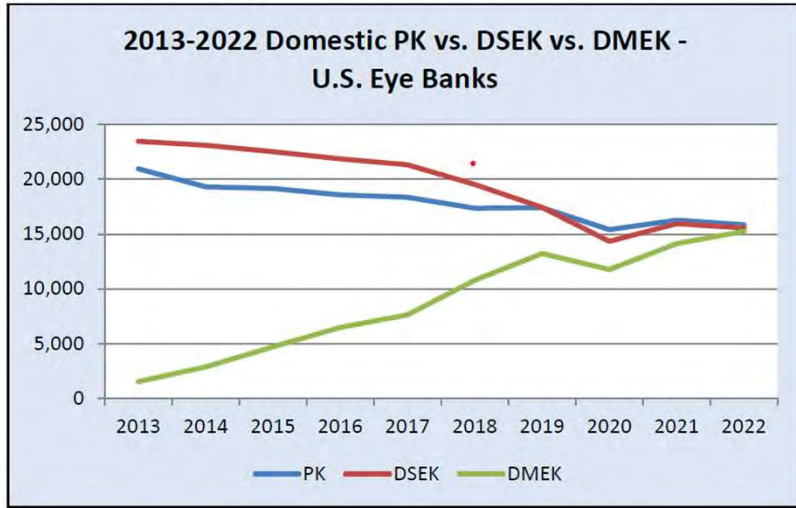


FIGURE 1. Anterior segment optical coherence

Endothelial Keratoplasty

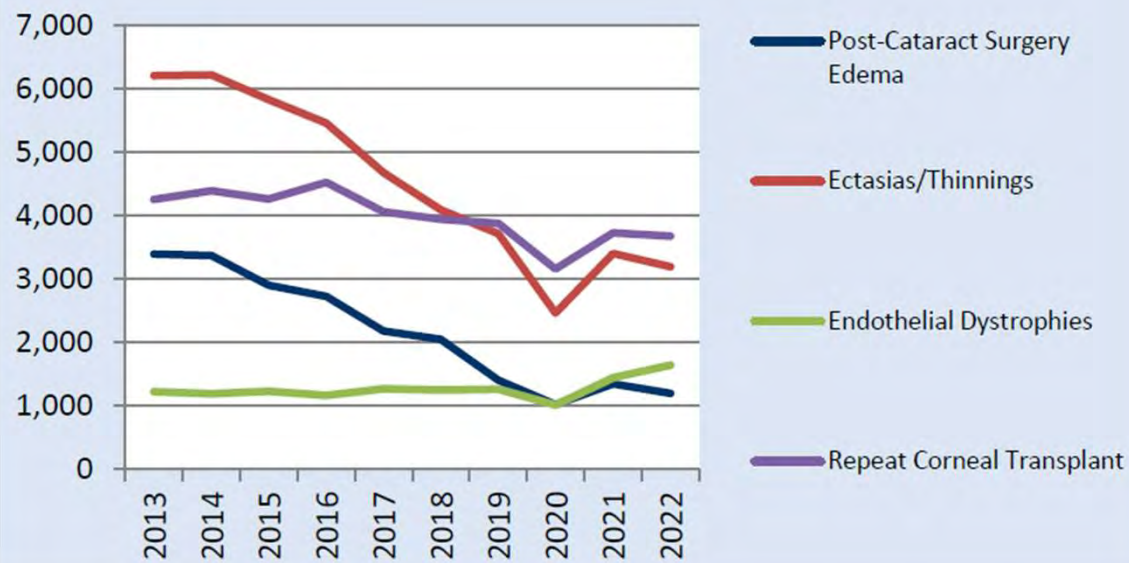
<https://www.reviewofoptometry.com/article/blurred-lines-43100>





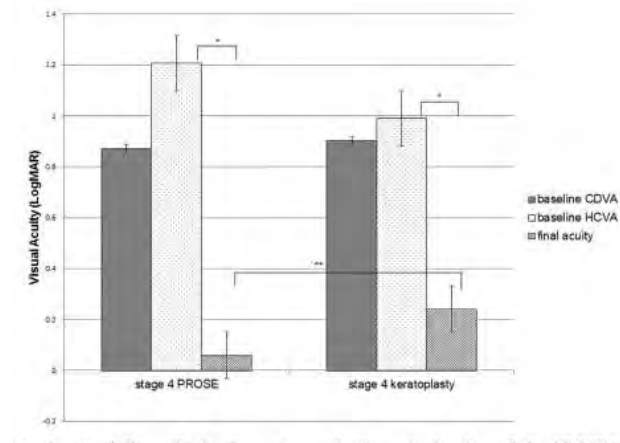
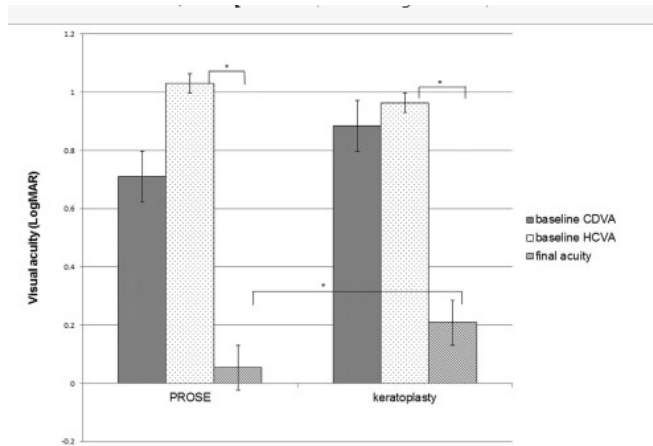
Current Eye Banking Statistics

2013-2022 Trends in Common PK Surgical Indications - U.S. Eye Banks (Worldwide Distribution)



10-year trends
in common
surgical
indications

Scleral lenses as an alternative to corneal transplantation



Deloss, K, Fattah N, Hood C. AJO 2014





Original article

Scleral Lenses Reduce the Need for Corneal Transplants in Severe Keratoconus

Carina Koppen^{a,*}, R. B. Elke O. Kroes^c, Lieselotte Anthonissen^c, Maarten Van Hooy^c, Sonthe Ni Dhoubhghall^{a,b}, Louise Vermeulen^{a,b}

Koppen et al

Study: 75 eyes

Eight eyes underwent [transplant surgery](#) because of insufficient [visual acuity from CL](#)

Scleral lenses were prescribed in 51 of 75 eyes

3 eyes prescribed hybrid or GP lenses

Results:

40 of the 51 eyes with severe keratoconus that would otherwise have undergone transplant surgery were successfully treated with long-term scleral lens wear



Impact of Scleral Contact Lens Use on the Rate of Corneal Transplantation for Keratoconus Cornea 2021

Study:

- 2806 eyes included in the study
- 36.2% no CL use
- 7.2% soft, 33.9% rigid gas permeable (RGP), and 22.7% scleral
- 3.2% of eyes underwent keratoplasty

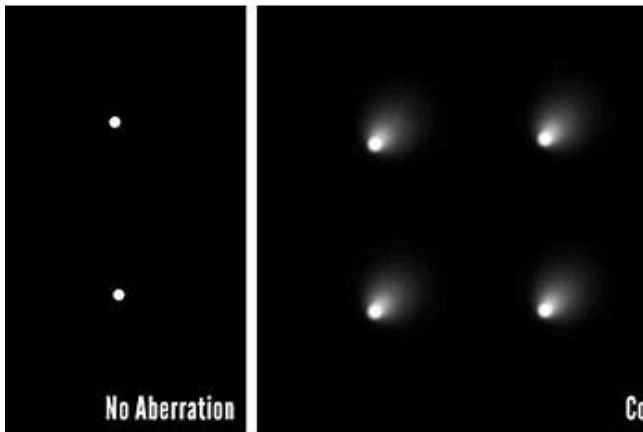
Conclusions:

- Physicians should maximize the use of scleral or RGP CL because patients who successfully use CL have almost one-fifth the risk of undergoing keratoplasty

Ling JJ, Mian SI, Stein JD, Rahman M, Poliskey J, Woodward MA. Impact of Scleral Contact Lens Use on the Rate of Corneal Transplantation for Keratoconus. *Cornea*. 2020. May 2020 Published ahead of print: <https://doi.org/10.1097/ICO.0000000000002388>.



Wavefront Optics



Advanced Measurement
and Diagnostics

Customized Contact
Lens Design

Enhanced Visual
Performance

Coma

Trefoil

Spherical Aberration

Corneal Cross Linking (CXL)

Introduced by Wollensack et al. (2003)

Minimally invasive procedure

Goal: **HALT the progression of KC** NOT ELIMINATE IT

Off-label:

- post-op ectasia*
- treatment of recalcitrant corneal ulcers

CXL

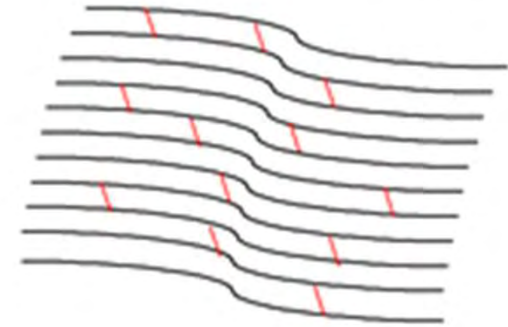
Definition

- process in which a combination of a ultra-violet light (UV) light and a photochemical reaction induces free radicals, causing a chemical connection among collagen fibers.

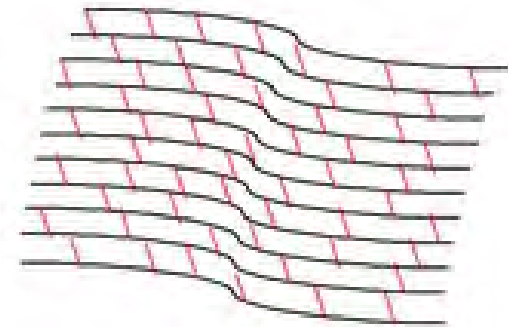
Goals

Increase tissue hardening and strengthening

Less Cross-linking (weaker)



More Cross-linking (stronger)



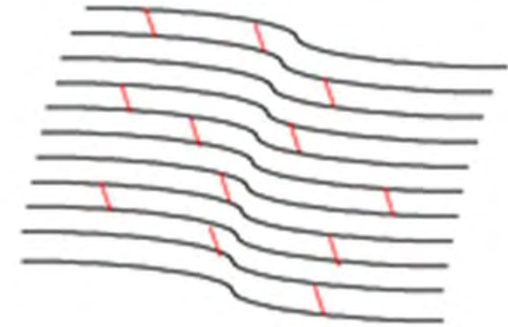
CXL

Hydrogen bonds → Increase collagen fibril diameter

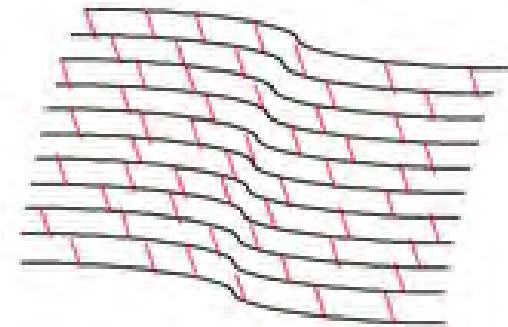
Increase anti-collagenase activity

Riboflavin – protective

Less Cross-linking (weaker)



More Cross-linking (stronger)



Present

Incidence

Historically: 1:2000

U.S. is approximately 54.5 per 100,000 (lifetime 1:375)

Netherlands: 13.3 per 100,000

Saudi Arabia: 20 to 25 per 100,000 people annually

Israel: 3.18% among specific populations, such as Arab students

Iran: 20–25 per 100,000 annually

Meta Analysis: 50 and 230 per 100,000 individuals (138:100,00)

Black and Latino: 50% more likely than whites

Why the variability?



Better detection



Variable Data Collection

Hospital Based Studies
Mandatory Health Insurance
Database



Environmental Stressors

UV Exposure
Dry Climate



Genetics

Etiology

The study of the causes, origins, or reasons behind the way that things are, or the way they function, or it can refer to the causes themselves



Genetics

Family History

Inheritance Pattern

Genes Associated with Keratoconus



Keratoconus Genetics

Heredity of keratoconus remains elusive and not widely established

Genome-wide linkage and association studies

- LOX (collagen crosslinking enzyme lysyl oxidase); 5q32-q33
- Calpastatin; 5q14.3-q21.1
- HGF (hepatocyte growth factor)
- RAB3GAP1 (RAB3 GTPase activating protein catalytic subunit)
- TGFBI
- VSX1
- SOD1 (superoxide dismutase 1)
- COL4A2 (type IV collagen alpha 3) and COL4A4 (type IV collagen alpha 4)

Chances of blood relative developing keratoconus is <10%

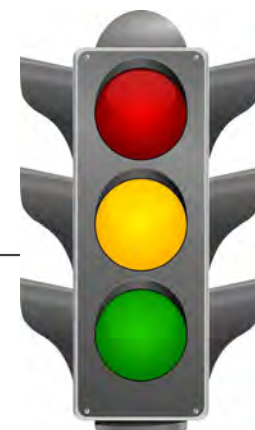


Table 1 KC genes and identified variants

Gene	Function	CHR	Variant (s)	Method (Reference)	Variant Location
LOX	Lysyl oxidase, participates in collagen cross-linking	5q23.2	rs10519694	GWLS/LD/FM	Intron
			rs1800449/rs2288393	GWLS/LD/FM	Missense
			rs41407546	S	Missense
			rs2956540	GWLS/LD/FM	Intron
COL5A1	Collagen type V, alpha-1 chain, part of fibril-forming corneal collagen	9q34.2-q34.3	rs1536482 rs7044529	GWLS/FM/CCT GWAS GWLS/FM/CCT GWAS	5' near gene Intron
CAS7	Calpain/calpastatin, proteolytic degradation	5q15	rs4434401	GWLS/FM	Intron
RAB3GAP1	Rab GTPase activating protein, regulates exocytosis	2q21.3	rs4954218	GWAS	5' near gene
HGF	Hepatocyte growth factor, involved in corneal wound healing	7q21.1	rs3735520	GWAS, TG	1 KB promoter
			rs1014091	GWAS, S	1 KB promoter
			rs17501108	S	1 KB promoter
			rs2286194	S	Intron
FNDC3B	Fibronectin, extracellular matrix protein	3q26.31	rs4894535	CCT GWAS	Intron
FOXD1	Transcription factor	13q14.1	rs2721051	CCT GWAS, LA CCT GWAS	3' near gene
TGFB1	Transforming growth factor beta-induced	5q31.1	Multiple rare variants	S	Exon
ZNF469	Transcription factor, regulates corneal collagen structure and synthesis	16q24.2	rs9938149	CCT GWAS, TG	3' near gene
			Multiple rare variants	S	Exon
DOCK9	Dedicator of cytokinesis 9, Guanine nucleotide-exchange factor	13q32.3	c.2262A>C p.Gln754His	GWLS/S	Missense
MPDZ-NFTB	Not available	9p23	rs1324183	CCT GWAS, TG	Intergenic
WNT10A	Member of WNT gene family of secreted signaling proteins	2q35	rs121908120	CCT GWAS	Missense
ZEB1	Zinc finger transcription factor	10p11.22	c.1920G>T; p.Gln640His	S	Missense
SOD1	Superoxide dismutase 1, cytoplasmic antioxidant enzyme	21q22.11	Multiple SNVs, deletion	S	Intron
IL1A	Interleukin 1alpha, cytokine	2q13	rs2071375	TG, S	Intron
IL1B	Interleukin 1beta, cytokine	2q13	rs1143627	TG, S	Promoter
			rs16944	TG, S	Promoter
COL4A3	Collagen type IV, alpha-3 chain, structural part of corneal membranes	2q36.3	Multiple SNVs	S	Missense
COL4A4	Collagen type IV, alpha-4 chain, structural part of corneal membranes	2q36.3	Multiple SNVs	S	Missense
VSX1	Visual system homeobox 1, transcription factor	20p11.2	Multiple SNVs	S	Missense, silent, intronic

Table abbreviations: KC = keratoconus; CHR = chromosome; GWLS = genome-wide linkage study; GWAS = genome-wide association study; LD = linkage disequilibrium; FM = fine mapping; S = sequencing; TG = targeted genotyping; CCT = central corneal thickness; SNV = single nucleotide variant; LA =



Biomechanical and Structural Contributions

Pathogenesis

Gene mutation

Dysregulated collagen synthesis

Extracellular Matrix degradation

keratocyte apoptosis

Pathogenesis

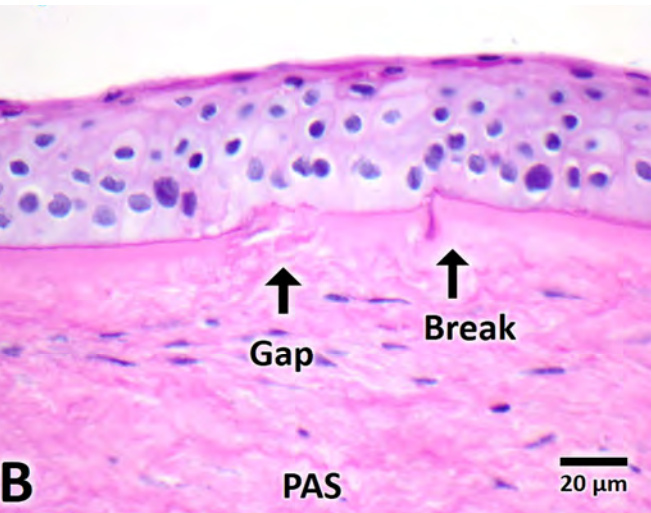
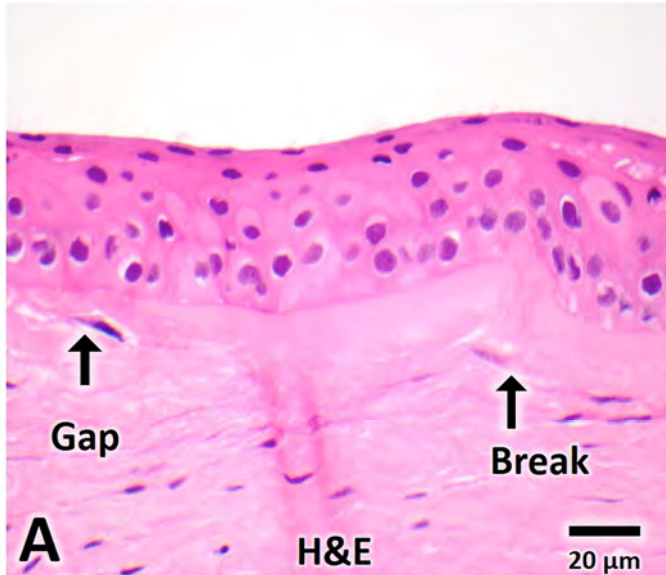
Altered biomechanical elasticity of cornea

Loss of anterior stroma

- Anterior stroma more highly compact
- May be more resistant to mechanical deformation than the posterior stroma

Pre-existing corneal abnormality

Intrinsic collagen weakness (keratoconus)



Environmental and Systemic Influences

Eye Rubbing

UV Exposure

Atopic Conditions

Asthma

Obstructive Sleep Apnea/Obesity

Floppy Eyelid

Connective Tissue Disease

Systemic/CT
Diseases

Downs Syndrome

Eahlers-Danlos

Osteogenesis Imperfecta

Mitral Valve Prolapse

Marfans

Loeys-Dietz

Stickler

RA

Inflammation

Elevated levels of inflammatory mediators have been detected in the tear film

Systemic Inflammation → Severity

IL-1 β , IL-6, TNF- α , and IFN- γ

Chemokines such as CXCL-10, CCL-2, and CCL-5 were found to be upregulated in KC. CXCL-10, associated with T-cell recruitment, may contribute to corneal inflammation and thinning

Cytokine – signaling proteins secreted by cells that induce directional movement of leukocytes, as well as other cell types, including endothelial and epithelial cells

Interleukin -**Interleukins** (ILs) are a group of cytokines (signals) that are expressed and secreted by white blood cells (leukocytes) as well as some other body cells.



Keratoconus

Asymmetrical

Progression

Burnout Period

Future – Unknowns

Why is kc asymmetrical

What causes disease burnout to happen

Why does one eye progress more than the other

Long Term CXL Studies

Disease progression in
childhood/adolescents

Treatment outcomes in pediatric patients

Patient Centric Care

Patient
Education
Strategies

Genetic
Counseling



Emerging Technology

Artificial Intelligence

Pharmacology

Advanced Imaging



Artificial Intelligence

Advanced Imaging Analysis

- Improved algorithms

Predicting Disease Progression

- Combining imaging with genetics and biomarkers

Screening Tools

Customized CXL Treatments

- energy levels, duration, and riboflavin concentration

Treatment Outcome Prediction

- Candidate Selection

Ferreira-Mendes, J., Lopes, B., Ribeiro, M. P., Neves, V. F., & Salgado-Borges, J. (2020). Artificial Intelligence in

Corneal Topography and Tomography: A Review. *Journal of Clinical Medicine*, 9(12), 4095

Samassa, F., Colin, J., & Rabut, G. (2020). Keratoconus Detection Using Advanced Imaging and Processing Systems. *Diagnostics*, 10(6), 463

Kanayama, S., Hayashi, T., & Kawakami, H. (2021). Diagnosis of Keratoconus Using Artificial Intelligence System Based on Photokeratoscope Images. *Translational Vision Science & Technology*, 10(7), 28



Pharmacology

Matrix Metalloproteinase (MMP) Inhibitors

Anti-Inflammatory Agents

Antioxidants

Growth Factors and Cytokine Modulators

Gene Therapy

Proteinase Inhibitors

Novel Drug Delivery Systems



Rho Kinase Inhibitors (ROCK)

Inhibit Rho enzyme activity

Rho enzymes: Cell contraction, motility, proliferation

- **Corneal Wound Healing**
- **Fibrosis and Scarring**
- **Corneal Endothelial Health**
- **Inhibition of Apoptosis**

Hatami-Marbini, H., & Rahimi, A. (2015). "Collagen cross-linking therapies for keratoconus: A critical review." *Journal of Current Ophthalmology*, 27(5), 278-289

Global Disparities in Care

Social Determinants of Health

- **Economic Stability**
- **Education Access and Quality:**
- **Social and Community Context:**
- **Health Care Access and Quality**
- **Neighborhood and Built Environment**



Global Disparities

Eyebank Access

- US, India, Europe

Infrastructure

Regulatory Models and Policies

Cultural Attitudes toward organ donation

Healthcare resources

Summary

Huge advancements have been made in detection and diagnoses of keratoconus

Advancements in contact lens options has demonstrated optometry's role in reducing surgical intervention and long-term complications

Research is ongoing in biochemical, tear film and genetics

There is emerging technology on the forefront such as the use of AI and possible pharmacological intervention and/or gene therapy

We still have significant gaps in understanding of research

More to come!

References

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Pilger D, Torun N, Maier AB, Schroeter J. Pseudophakic corneal donor tissue in Descemet membrane endothelial keratoplasty (DMEK): implications for cornea banks and surgeons. *BMJ Open Ophthalmol.* 2020 Aug 23;5(1):e000524. doi: 10.1136/bmjophth-2020-000524. PMID: 32879903; PMCID: PMC7445340.

Ferreira-Mendes, J., Lopes, B., Ribeiro, M. P., Neves, V. F., & Salgado-Borges, J. (2020). Artificial Intelligence in Corneal Topography and Tomography: A Review. *Journal of Clinical Medicine*, 9(12), 4095

Samassa, F., Colin, J., & Rabut, G. (2020). Keratoconus Detection Using Advanced Imaging and Processing Systems. *Diagnostics*, 10(6), 463

Kanayama, S., Hayashi, T., & Kawakami, H. (2021). Diagnosis of Keratoconus Using Artificial Intelligence System Based on Photokeratoscope Images. *Translational Vision Science & Technology*, 10(7), 28

Hatami-Marbini, H., & Rahimi, A. (2015). "Collagen cross-linking therapies for keratoconus: A critical review." *Journal of Current Ophthalmology*, 27(5), 278-289

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance.

MAKING SPECIALTY CONTACT LENS BILLING WORK

CLARKE D. NEWMAN, OD, FAAO, FBCLA, FSLS, FNAP
2024 CORNEA, CONTACT LENS AND CONTEMPORARY
VISION CARE SYMPOSIUM
DECEMBER 7, 2024
COPE #: ??????-CL

FINANCIAL DISCLOSURES

- PAID CONSULTANT
 - GPLI
 - REVIEW OF OPTOMETRY
 - PERCEPT
 - TARSUS
- CONTRIBUTING EDITOR: *CONTACT LENS SPECTRUM*
- STUDY CONTRIBUTOR: UHCO
- NO PROPRIETARY INTEREST IN ANY SUBJECTS DISCUSSED
- FDA “OFF-LABEL” USES WILL BE DISCUSSED

COURSE DESCRIPTION

- THIS ONE-HOUR COURSE WILL DISCUSS METHODS FOR CODING AND BILLING FOR MEDICALLY NECESSARY CONTACT LENSES AND FOR INCORPORATING ICD-10-CM INTO MEDICALLY NECESSARY CONTACT LENS PRESCRIBING

LEARNING OBJECTIVES

- ATTENDEES OF THIS COURSE WILL LEARN:
 - EFFECTIVE CODING AND BILLING STRATEGIES FOR MEDICALLY NECESSARY CONTACT LENSES (MNCL)

BIG-TIME DISCLAIMER!!!!!!

This meeting is a gathering of competitors, which is one of the two criteria for violating the Sherman Anti-Trust Act. The other criterion for a *per se* violation is to agree to, or appear to agree to, do something, like set fees, or boycott a supplier, or another competitor. This lecture includes a discussion of fees. **HOWEVER, THIS LECTURE IS NOT INTENDED IN ANY WAY TO BE CONSTRUED AS A DISCUSSION OF FEE SETTING. THE EXAMPLES GIVEN ARE INSTRUCTIONAL, AND ARE NOT INTENDED IN ANY WAY TO ENCOURAGE ANYONE TO SET ANY FEE AT ANY AMOUNT. QUESTIONS ABOUT FEES WILL NOT BE ANSWERED, AND DISCUSSION ABOUT FEES AMONG THE ATTENDEES OF THIS LECTURE, DURING THIS LECTURE, WILL NOT BE PERMITTED, AND IS STRONGLY DISCOURAGED AT ANY TIME AFTER THIS LECTURE!**

Do you understand?

¿Entiende usted?

Comprenez vous?

Verstehst du?

האם אתה מבין?

Ты понимаешь?

The Ethics of This Stuff

I believe that it is a moral failure to possess a skill or a body of knowledge that can end human suffering, and then fail to use that skill or knowledge because you do not charge enough to make that service a viable part of your practice.

Most doctors fail in medically necessary prescribing not because they lack the skill, but because they lose interest and motivation when they start to lose money.

When you charge enough so that you don't lose money, then you stay motivated enough to solve these complicated cases. I submit to you, that that is ethical!

The image features a light gray background with a subtle gradient. In the top-left and bottom-right corners, there are several realistic water droplets of various sizes, rendered with soft shadows and highlights to give them a three-dimensional appearance. The main text is centered in the middle of the page.

**“CLARKE, EVERYTHING THAT HAPPENS IN YOUR
PRACTICE IS YOUR FAULT”**

-IRV BORISH

Coding and Billing: All Your Questions Answered



<https://www.gpli.info/coding-billing/>

- Webinar: Specialty Contact Lens Coding and Billing Update: Presented in May 2022 by Dr. Clarke Newman
- Webinar: Reimbursement Paradigms in Myopia Management: Presented in September 2020 by Dr. Clarke Newman
- Billing, Coding and ICD-10 for Medically Necessary Contact Lenses (2022)
- Reimbursement Paradigms in Myopia Management (2022)
- Coding and Billing FAQ
- CPT Codes, HCPCS Codes and ICD-10 Codes (February 2016)
- Sample Patient Brochure
- Sample Insurance Letter of Medical Necessity 1
- Sample Insurance Letter of Medical Necessity 2
- Sample Insurance Letter of Medical Necessity 3
- Top 10 Errors in Coding and Billing

WHAT WE SAY DOESN'T MATTER (SORTA)

There is no escaping the fact that YOU have to do your homework to be successful at billing for medical services. There are enough contractual differences between carriers and between regions, that you have to determine what the payment policies and fees are for each type of service and for each carrier. If you practice in more than one locale, you have to do this legwork for each locale—PERIOD!

INTRODUCTION

- BASIC CONCEPTS
 - WHAT IS THE CONSUMER / PROVIDER / PAYOR / PURCHASER RELATIONSHIP?
 - WHAT IS THE DEFINITION OF “MEDICALLY NECESSARY?”
 - WHAT IS THE DIAGNOSIS / SERVICE / PAYMENT RELATIONSHIP?
 - WHAT ARE “COVERED” AND NON-COVERED” SERVICES?
- BILLING THE VISION CARE PLANS (VCP’S)
- Q & A

COVERED VS. NON-COVERED

- THIS CONCEPT IS IMPORTANT TO MEDICALLY NECESSARY CONTACT LENS PRESCRIBING
- NON-COVERED SERVICES ARE LISTED BY EXCLUSIONS IN THE NEGOTIATED COVERAGE PRODUCT (“INSURANCE PLAN”) AS DETAILED IN THE “SUMMARY PLAN DESCRIPTION” (SPD)
- NON-COVERED SERVICE EXCLUSIONS DO NOT DECIDE WHAT CARE YOU PROVIDE, JUST WHO PAYS FOR THE CARE YOU PROVIDE
 - INDEPENDENT CLINICAL JUDGMENT
 - NON-COVERED SERVICES ARE PAID BY THE CONSUMER DIRECTLY TO THE PROVIDER

ESTABLISHING MEDICAL NECESSITY FOR A COVERED SERVICE

- A CHIEF COMPLAINT RATIONAL TO A COVERED SERVICE SUCH AS AN INJURY, ILLNESS, OR DISEASE
- PROVIDING A COVERED SERVICE MUST BE INDICATED BY THE CHIEF COMPLAINT AND MUST BE ORDERED
- IF THE COVERED SERVICE IS A DIAGNOSTIC TEST, THEN THE DIAGNOSTIC TEST MUST BE INTERPRETED AND IT MUST AFFECT YOUR CLINICAL DECISION MAKING

MORE ON DOCUMENTATION FOR MEDICAL NECESSITY

92025 Corneal Topography Ordered and Reviewed by Clarke D Newman, OD, FAAO: *cdn*

Indication:

- Diagnose a Decrease in Vision thought to be Due to a Corneal Disease, Degeneration, Deformity, or Injury
- Monitor a Previously Diagnosed Corneal Disease, Degeneration, Deformity, or Injury
- Pre-Operative Evaluation of the Cornea to Rule Out Corneal Disease, Degeneration, Deformity, or Injury as a Contraindication to Surgery
- Post-Operative Evaluation of the Cornea to Rule Out Corneal Disease, Degeneration, Deformity, or Injury Resulting From the Surgery

Interpretation:

- | | |
|--|---|
| <input type="checkbox"/> No Detectable Defect | <input type="checkbox"/> (371.61) Keratoconus, Stable Condition |
| <input type="checkbox"/> (367.21) Regular Astigmatism | <input type="checkbox"/> KSS 0 <input type="checkbox"/> KSS 1 <input type="checkbox"/> KSS 2 <input type="checkbox"/> KSS 3 <input type="checkbox"/> KSS 4 <input type="checkbox"/> KSS 5 |
| <input type="checkbox"/> (367.22) Irregular Astigmatism | <input type="checkbox"/> (371.62) Keratoconus, Acute Hydrops |
| <input type="checkbox"/> (368.10) Subjective Visual Disturbance, Unspecified | <input type="checkbox"/> (371.70) Corneal Deformity, Unspecified |
| <input type="checkbox"/> (368.15) Other Visual Distortions | <input type="checkbox"/> (371.70) Keratoglobus |
| <input type="checkbox"/> (371.03) Central Opacity of Cornea | <input type="checkbox"/> (371.10) Pellucid Marginal Degeneration |
| <input type="checkbox"/> (370.31) Phlyctenular Keratoconjunctivitis | <input type="checkbox"/> (371.43) Bank-Shaped Keratopathy |
| <input type="checkbox"/> (371.31) Folds and Rupture of Bowman's Membrane | <input type="checkbox"/> (371.46) Nodular Corneal Degeneration |
| <input type="checkbox"/> (371.46) Nodular Degeneration of Cornea (Salzman's) | <input type="checkbox"/> (372.41) Peripheral Pterygium, Stationary |
| <input type="checkbox"/> (371.48) Peripheral Degenerations of Cornea (Terrien's) | <input type="checkbox"/> (372.42) Peripheral Pterygium, Progressive |
| <input type="checkbox"/> (371.57) Endothelial Corneal Dystrophy (Fuchs') | <input checked="" type="checkbox"/> (743.41) Anomalies of Corneal Size and Shape |

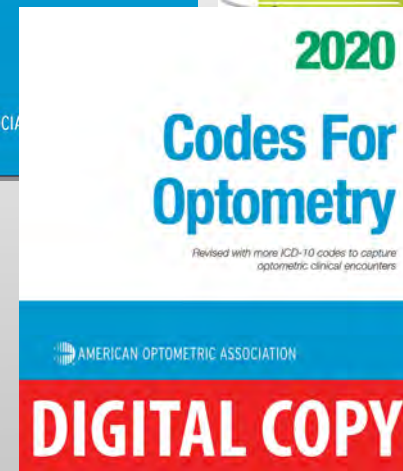
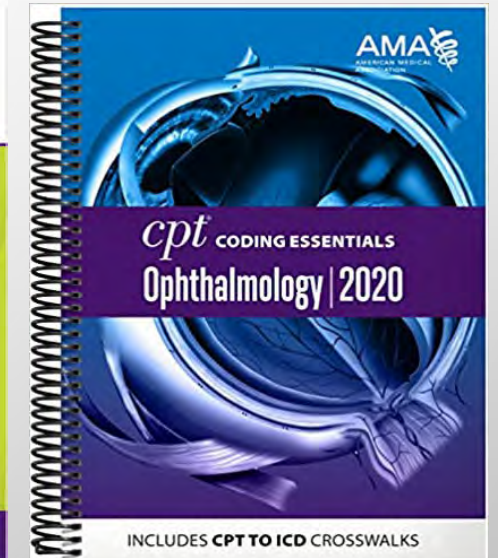
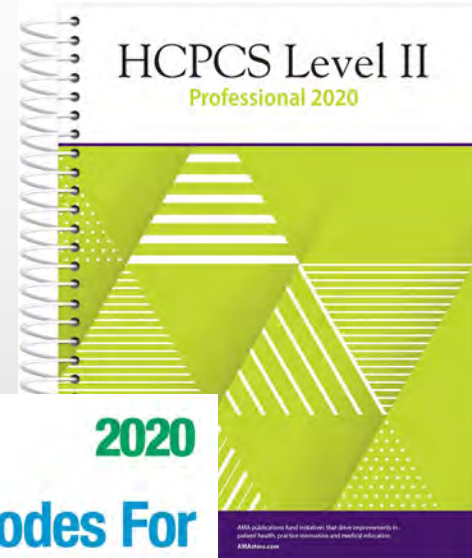
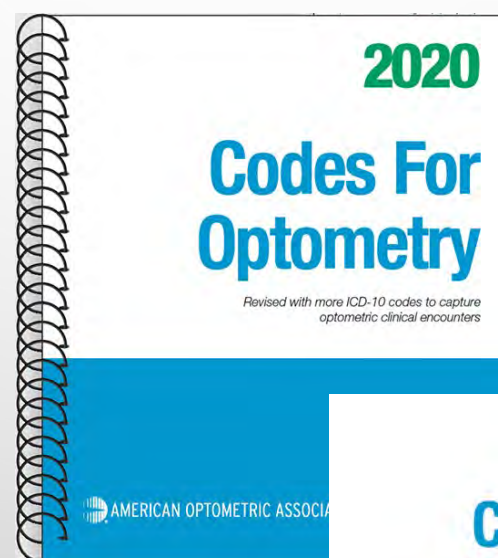
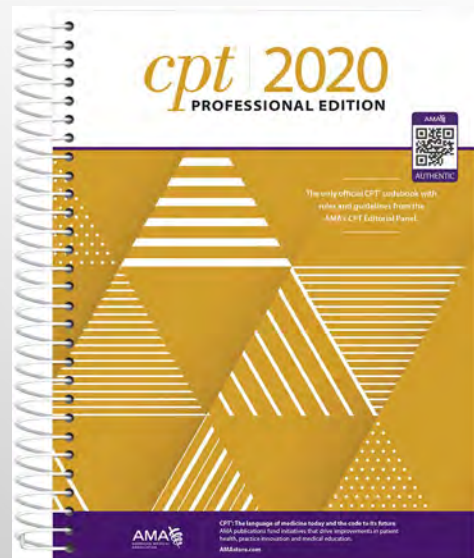
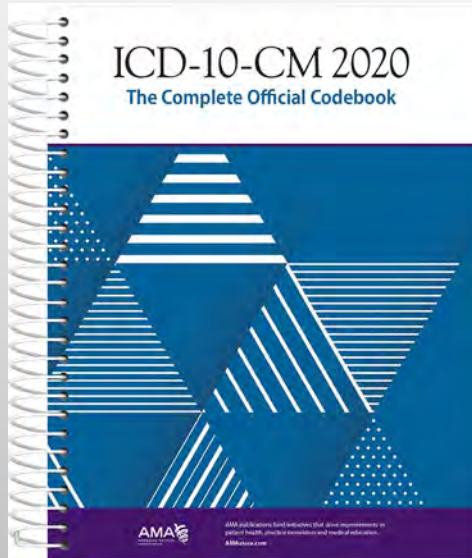
Plan:

- Monitor
- Prescribe Medically Necessary Contact Lenses
- Refer for Surgical Consultation
- Initiate Medical Therapy

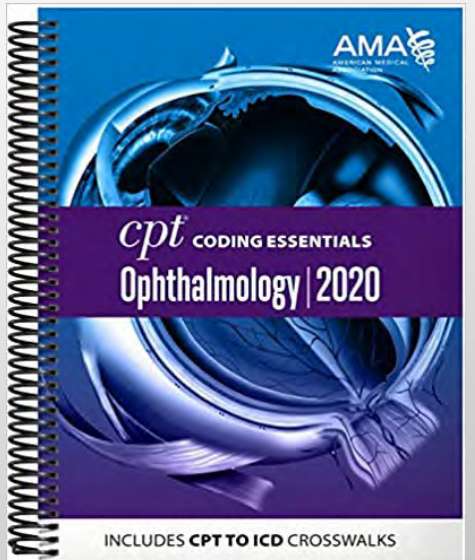
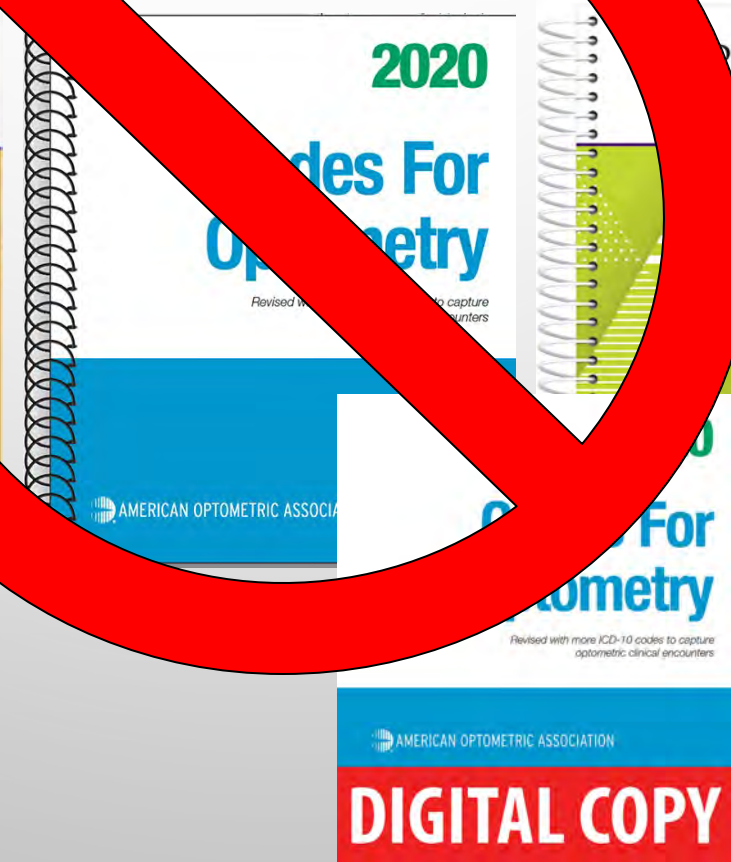
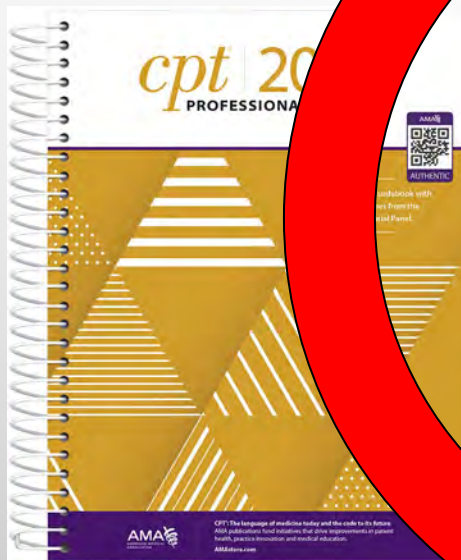
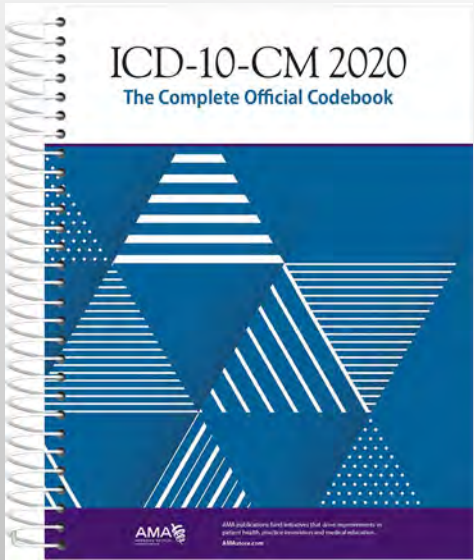
GUIDANCE MATERIALS

- WEBSITES
 - CMS WWW.CMS.GOV
 - FISCAL INTERMEDIARY
 - FIND YOUR JURISDICTION
 - PRIVATE CARRIERS
- REFERENCE BOOKS
 - 2023 ICD-9-CM
 - 2023 CPT
 - 2023 HCPCS
 - 2023 ICD-10-CM
- MEETINGS & JOURNALS

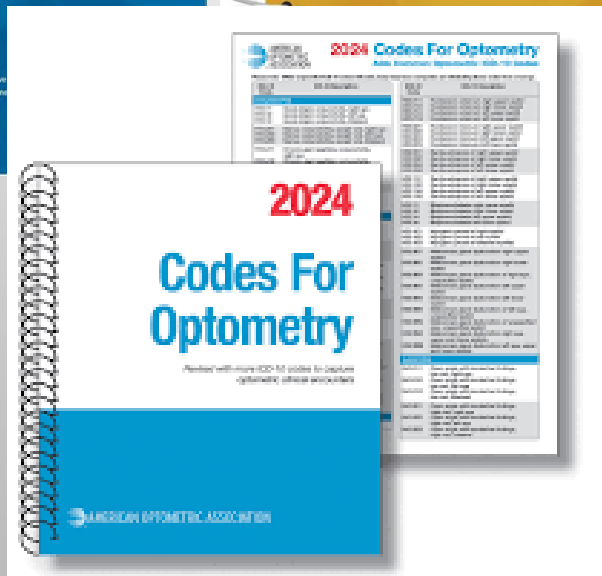
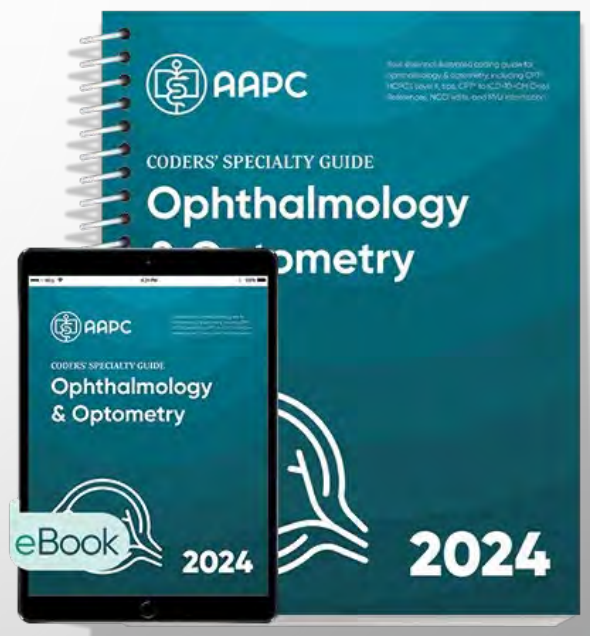
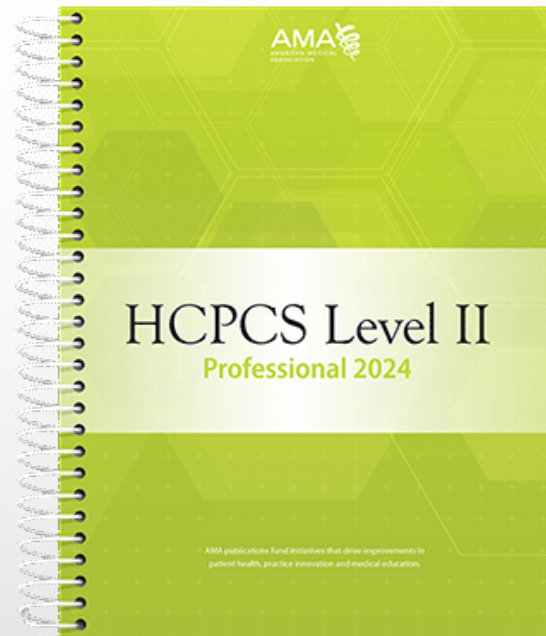
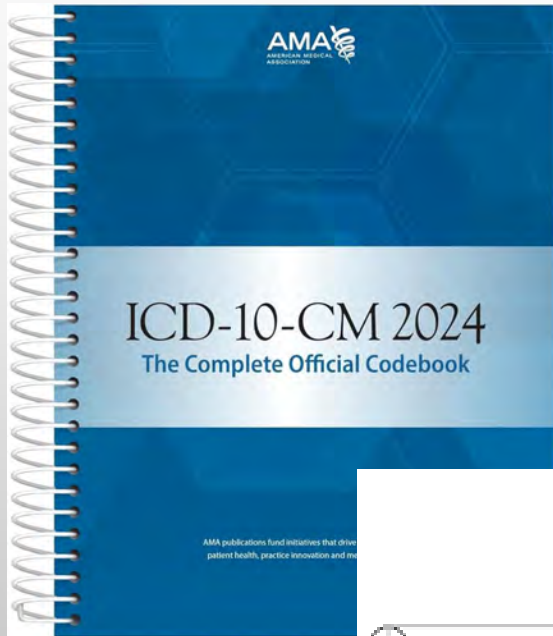
REFERENCE BOOKS



REFERENCE BOOKS



REFERENCE BOOKS



WEB BASED GUIDANCE

- OPTOMETRIC BILLING SOLUTIONS, INC.
 - DRS. JOE DELOACH AND PETER CASS, AND BJ AVERY AND SANDY YANKEE
 - [HTTP://OPTOMETRICBILLING.COM/](http://OPTOMETRICBILLING.COM/)
- AOA EXCEL
 - [HTTP://WWW.AOA.ORG/AOAEXCEL](http://WWW.AOA.ORG/AOAEXCEL)
- PRACTICE MANAGEMENT RESOURCES, INC.
 - DR. JOHN RUMPAKIS
 - [HTTP://WWW.PRMI.COM/](http://WWW.PRMI.COM/)

ESTABLISHING THE DIAGNOSTIC CODE SET

- DIAGNOSIS CODES
 - ICD-10-CM, USED SINCE OCTOBER 1, 2015—IF YOU ARE STILL USING ICD-9, WTF?
 - CPT LEVEL I CODES (CREATED BY THE AMA CPT EDITORIAL PANEL)
 - HCPCS (CPT LEVEL II)
- CARRIER DETERMINATION POLICIES
 - NATIONAL CARRIER DETERMINATIONS (NCD) FOR EYES NCD 80
 - [HTTP://WWW.CMS.GOV/REGULATIONS-AND-GUIDANCE/GUIDANCE/MANUALS/DOWNLOADS/NCD103C1_PART1.PDF](http://www.cms.gov/regulations-and-guidance/guidance/manuals/downloads/ncd103c1_part1.pdf)
 - LOCAL CARRIER DETERMINATIONS (LCD)



VERY IMPORTANT CONCEPT:
A TAUTOLOGY

It Is Not What You Get Paid!!!!

It Is What You Get to Keep at
Audit!!!!



UNDERSTANDING CPT CODES

- CODE TEXT
 - PLAIN LANGUAGE RULES, UNLESS SPECIFICALLY SUPERSEDED BY OTHER INSTRUCTIONS
- CODE SUB-TEXT
 - OFTEN, THESE OTHER INSTRUCTIONS ARE CONTAINED IN SUB-TEXT COMMENTS
- CODE PRE-TEXT / PREAMBLE
 - A PREAMBLE CAN CONTAIN INFORMATION THAT SHAPES A CODE OR A GROUP OF CODES
 - E/M CODES HAVE A PREAMBLE AND CODE SUBTEXTS
 - 9231X CODES HAVE A PREAMBLE
- CPT ASSISTANT
- CPT CHANGES
- CMS PUB-100 GUIDANCE
 - NCD'S ARE PROMULGATED HERE

ADVANCED BENEFICIARY NOTIFICATION (ABN) MODIFIERS

- GA—WAIVER OF LIABILITY STATEMENT ISSUED, AS REQUIRED BY PAYER POLICY
- GX—NOTICE OF LIABILITY ISSUED, VOLUNTARY UNDER PAYER POLICY
- GY—ITEM OR SERVICE STATUTORILY EXCLUDED, DOES NOT MEET THE DEFINITION OF ANY MEDICARE BENEFIT
- GZ—ITEM OR SERVICE EXPECTED TO BE DENIED AS NOT REASONABLE AND NECESSARY

[HTTPS://WWW.NOVITAS-SOLUTIONS.COM/WEBCENTER/PORTAL/MEDICAREJH/PAGEBYID?CONTENTID=00144508&_AFLOOP=47633128992458#!%40%40%3F_afloop%3D47633128992458%26contentid%3D00144508%26_adf.ctrl-state%3DMG5VJGXVT_33](https://www.novitas-solutions.com/webcenter/portal/medicarejh/pagebyid?contentid=00144508&_afloop=47633128992458#!%40%40%3F_afloop%3D47633128992458%26contentid%3D00144508%26_adf.ctrl-state%3DMG5VJGXVT_33)



THE PRESCRIBING CODES

GET THIS STUFF RIGHT IF YOU WANT TO GET PAID



CPT PREAMBLE FOR THE 9231X CODES

The prescription of contact lenses includes specification of optical and physical characteristics (such as power, size, curvature, flexibility, gas-permeability). It is NOT a part of the general ophthalmological services.

The fitting of a contact lens includes instruction and training of the wearer and incidental revision of the lens during the training period.

Follow-Up of successfully fitted extended wear lenses is reported as part of a general ophthalmological service. (92012 *et seq*)

The supply of contact lenses may be reported as part of the fitting. It may also be reported separately by using the appropriate supply code.”

CONTACT LENS SERVICES

- 92310(4)—PRESCRIPTION OF OPTICAL AND PHYSICAL CHARACTERISTICS OF AND FITTING OF CONTACT LENS, WITH MEDICAL SUPERVISION OF ADAPTATION; CORNEAL LENS, BOTH EYES, EXCEPT FOR APHAKIA
- 92311(5)—CORNEAL LENS FOR APHAKIA, ONE EYE
- 92312(6)—CORNEAL LENS FOR APHAKIA, BOTH EYES
- 92313(7)—CORNEOSCLERAL LENS
- 92325—MODIFICATION OF CONTACT LENS (SEPARATE PROCEDURE), WITH MEDICAL SUPERVISION OF ADAPTATION
- 92326—REPLACEMENT OF CONTACT LENS
- 92499—UNLISTED OPHTHALMOLOGICAL SERVICE OR PROCEDURE

CONTACT LENS SERVICES: IMPORTANT CONCEPTS

- CHARGE ANOTHER CONTACT LENS SERVICE FEE IF YOU CHANGE THE LENS DESIGN “SUBSTANTIALLY”
 - THAT IS, A CHANGE THAT IS NOT AN “INCIDENTAL REVISION”
- FOLLOW UP VISITS ARE NOT PART OF THE 9231X CODES. THE “SUPERVISION OF ADAPTATION” REQUIREMENT IS MET AT THE FIRST FOLLOW-UP VISIT IF THEY HAVE REACHED THE PRESCRIBED WEARING TIME
- SUBSEQUENT FOLLOW-UP VISITS ARE A PART OF A GENERAL OPHTHALMOLOGICAL SERVICE—YOU ARE MEDICALLY EVALUATING THE EFFECT OF THE PRESENCE OF THE CONTACT LENS ON THE OCULAR TISSUE

CONTACT LENS SERVICES—BANDAGE LENS

- 92070—BANDAGE CONTACT LENS CODE—NO LONGER IN USE!!!!
IT WAS DELETED IN 2012. (I STILL GET QUESTIONS ON THIS)
- 92071—FITTING OF CONTACT LENS FOR TREATMENT OF OCULAR SURFACE DISEASE
 - DO NOT REPORT 92071 IN CONJUNCTION WITH 92072
 - REPORT SUPPLY OF LENS SEPARATELY WITH 99070 OR APPROPRIATE SUPPLY CODE

CONTACT LENS SERVICES—KERATOCONUS

- 92072—FITTING OF CONTACT LENS FOR MANAGEMENT OF KERATOCONUS, INITIAL FITTING
 - FOR SUBSEQUENT FITTINGS, REPORT USING EVALUATION AND MANAGEMENT SERVICES OR GENERAL OPHTHALMOLOGICAL SERVICES
 - DO NOT REPORT 92072 IN CONJUNCTION WITH 92071
 - REPORT SUPPLY OF LENS SEPARATELY WITH 99070 OR APPROPRIATE SUPPLY CODE

GUIDANCE ON THE 92072 CODE: “INITIAL FITTING”

ACCORDING TO THE CPT ASSISTANT, CODE 92072, FITTING OF CONTACT LENS FOR MANAGEMENT OF KERATOCONUS, INITIAL FITTING, IS REPORTED FOR INITIAL FITTINGS ONLY. THE DESCRIPTION OF WORK FOR INITIAL FITTINGS INCLUDES THE RESULTS OF DIAGNOSTIC TESTS DONE PRIOR TO CONTACT LENS FITTING TO ASSESS THE CORNEAL ECTASIA, WHICH ARE USED IN CONCERT WITH SLIT LAMP EXAMINATION TO ASSESS CORNEAL SHAPE AND DETERMINE INITIAL CONTACT LENS PARAMETERS (E.G., DIAMETER, BASE CURVE AND SECONDARY CURVES). LENS DESIGNS CAN INCLUDE CORNEAL, SCLERAL, HYBRID, OR PIGGYBACK SYSTEMS. KERATOMETRY, LID ANATOMY, TEAR FILM AND REFRACTION ARE ALSO PERFORMED AND/OR RECHECKED. IF THE LENS NEEDS TO BE CHANGED BECAUSE IT NO LONGER FITS THE PATIENT'S NEEDS, THE FITTING OF A NEW LENS IS CONSIDERED AN INITIAL FITTING AND SHOULD INCLUDE ALL OF THE SERVICES NOTED ABOVE.

GUIDANCE ON THE 92072 CODE: “INITIAL FITTING”

ACCORDING TO THE CPT ASSISTANT, CODE 92072, FITTING OF CONTACT LENS FOR MANAGEMENT OF KERATOCONUS, INITIAL FITTING, IS REPORTED FOR INITIAL FITTINGS ONLY. THE DESCRIPTION OF WORK FOR INITIAL FITTINGS INCLUDES THE RESULTS OF DIAGNOSTIC TESTS DONE PRIOR TO CONTACT LENS FITTING TO ASSESS THE CORNEAL ECTASIA, WHICH ARE USED IN CONCERT WITH SLIT LAMP EXAMINATION TO ASSESS CORNEAL SHAPE AND DETERMINE INITIAL CONTACT LENS PARAMETERS (E.G., DIAMETER, BASE CURVE AND SECONDARY CURVES). LENS DESIGNS CAN INCLUDE CORNEAL, SCLERAL, HYBRID, OR PIGGYBACK SYSTEMS. KERATOMETRY, LID ANATOMY, TEAR FILM AND REFRACTION ARE ALSO PERFORMED AND/OR RECHECKED. **IF THE LENS NEEDS TO BE CHANGED BECAUSE IT NO LONGER FITS THE PATIENT'S NEEDS, THE FITTING OF A NEW LENS IS CONSIDERED AN INITIAL FITTING AND SHOULD INCLUDE ALL OF THE SERVICES NOTED ABOVE.**

HCPCS MATERIAL CODES

- V2510—CONTACT LENS, GP, SPHERICAL, PER LENS
- V2511—CONTACT LENS, GP, TORIC, PER LENS
- V2512—CONTACT LENS, GP, BIFOCAL, PER LENS
- V2513—CONTACT LENS, GP, EXTENDED WEAR, PER LENS
- V2520—CONTACT LENS, HYDROPHILIC, SPHERICAL, PER LENS
- V2521—CONTACT LENS, HYDROPHILIC, TORIC, PER LENS
- V2522—CONTACT LENS, HYDROPHILIC, BIFOCAL, PER LENS
- V2523—CONTACT LENS, HYDROPHILIC, EXTENDED WEAR, PER LENS
- V2530—CONTACT LENS, IP, SCLERAL, PER LENS
- V2531—CONTACT LENS, GP, SCLERAL, PER LENS
- V2627—SCLERAL COVER SHELL
- V2599—CONTACT LENS, OTHER TYPE

USING THE UNLISTED CODES

- USE THE “UNLISTED CODES” (92499 & V2599) FOR SERVICES AND MATERIALS THAT ARE BEYOND THE SCOPE OF THE OTHER CONTACT LENS PRESCRIBING CODES
- MEDICALLY NECESSARY LENSES IN THIS CATEGORY
 - HYBRID LENSES
 - HAND PAINTED PROSTHETIC LENSES
 - LENSES MADE FROM OCULAR SURFACE MOLDING
 - **MYOPIA MANAGEMENT**
- NEED TO DESCRIBE IN BOX 19
- NEED LETTERS OF MEDICAL NECESSITY

DOCUMENTATION

- REMEMBER, ALL DOCUMENTATION SHOULD SUPPORT YOUR DIAGNOSIS AND TREATMENT PLAN
- EACH TEST MUST BE RATIONAL TO THE DIFFERENTIAL DIAGNOSIS AS GUIDED BY THE CHIEF COMPLAINT
- FAILURE TO DOCUMENT FULLY THE CHIEF COMPLAINT, THE ASSOCIATED HPI, THE OBJECTIVE TESTING (INCLUDING THE ORDER, THE INTERPRETATION, AND CLINICAL DECISION MAKING), THE CLINICAL DIAGNOSTIC EVALUATION AND RESULTS MAY RESULT IN A FAILED AUDIT

CODING AND BILLING FOR THE CROSSLINKING PATIENT

- CPT LEVEL I TEMPORARY CODE 0402T COLLAGEN CROSS-LINKING OF CORNEA (INCLUDING REMOVAL OR THE CORNEAL EPITHELIUM AND INTRAOPERATIVE PACHYMETRY WHEN PERFORMED).
- J2787 – RIBOFLAVIN 5'- PHOSPHATE, OPHTHALMIC SOLUTION, UP TO 3ML
- THESE TEMPORARY CODES DO NOT HAVE ANY GLOBAL PERIOD
- ALL POST-OPERATIVE CARE DELIVERED FOR THE CROSSLINKING PATIENT IS BILLED IN THE USUAL MANNER FOR GENERAL OPHTHALMOLOGICAL CODES OR EVALUATION & MANAGEMENT CODES
- THIS CODE EXPIRES AT THE END OF 2024, WHICH MEANS A 60000 CATEGORY I SURGICAL CODE WILL LIKELY BE PROMULGATED THIS YEAR, WHICH MAY HAVE A GLOBAL PERIOD GREATER THAN ZERO.



VISION CARE PLAN MNCL BENEFITS

KNOW THESE PROCEDURES OR PAY THE PRICE



VISION CARE PLANS (VCP'S)

- VISION SERVICE PLAN[®] (VSP)
- EYEMED[®]
- UNITED HEALTHCARE[®] / SPECTERA[®]
- VERSANT HEALTH[™] (SUPERIOR VISION[™] & DAVIS VISION[™])
- VISION BENEFITS OF AMERICA (VBA)

THE LIMITED DATA SET

- PAYORS WILL SOMETIMES LIMIT THE DIAGNOSES THAT ARE CONSIDERED TO BE *PER SE* MEDICALLY NECESSARY TO A LIST
- THESE DATA SETS ARE PROMULGATED IN “CARRIER DETERMINATIONS”



VSP[®] : VISUALLY NECESSARY CONTACT LENSES

- LOOK IN THE 2024 MANUAL
 - GO WWW.EYEFINITY.COM, AND LOG IN
 - CLICK “VSPONLINE” DOWN THE RIGHT-HAND SIDE
 - CLICK “MANUALS” DOWN THE LEFT-HAND SIDE
 - CLICK “VSP[®]”
 - UNDER “PLANS AND COVERAGE,” CLICK “CONTACT LENS BENEFITS”
 - SCROLL DOWN TO “VISUALLY NECESSARY CONTACT LENSES”
 - PRINT THE PDF VERSION AND KEEP IT AVAILABLE TO ANSWER QUESTIONS

VSP[®] : QUALIFIED DIAGNOSES

- APHAKIA
- NYSTAGMUS
- KERATOCONUS
- ANIRIDIA
- CORNEA TRANSPLANT
- HEREDITARY CORNEAL DYSTROPHIES
- ANISOMETROPIA ≥ 3.00 D IN ANY MERIDIAN
- AMMETROPIA ≥ 10.00 D IN ANY MERIDIAN
- IRREGULAR ASTIGMATISM

VSP[®] : QUALIFIED DIAGNOSES

- ACHROMATOPSIA
- ALBINISM
- POLYCHORIA, ANISOCORIA (CONGENITAL)
- PUPILLARY ABNORMALITIES

VSP[®] : EXCLUSIONS

- CORNEAL REFRACTIVE THERAPY, ORTHOKERATOLOGY, AND CONTACT LENSES FOR MYOPIA MANAGEMENT ARE NOT COVERED UNDER NECESSARY CONTACTS, COVERED CONTACT LENSES, OR THE VSP ELEMENTS PLAN.
 - PATIENTS CAN USE THEIR ELECTIVE CONTACT LENSES ALLOWANCE TOWARDS THE COST OF CORNEAL REFRACTIVE THERAPY, ORTHOKERATOLOGY, OR MYOPIA MANAGEMENT CONTACT LENS MATERIALS ONLY. THE CONTACT LENS FITTING AND EVALUATION PORTION OF THE TREATMENT IS A PRIVATE TRANSACTION BETWEEN YOU AND THE PATIENT.
- OTHER THINGS

VSP[®] VISUALLY NECESSARY CONTACT LENSES

- VISUALLY NECESSARY CONTACT LENSES AREN'T TYPICALLY COVERED FOR PATIENTS WHO HAVE RECEIVED ANY ELECTIVE COSMETIC EYE SURGERY (E.G., LASIK, PRK, OR RK). HOWEVER, PROCEDURES RESULTING WITH CONCERNS SUCH AS ECTASIA, SCARRING OR IRREGULAR CORNEAS CAUSING VISION PROBLEMS THAT REQUIRE CONTACT LENSES TO PROVIDE FUNCTIONAL VISION, ARE COVERED UNDER THE NCL BENEFIT, SO LONG AS PATIENTS MEET THE NCL CRITERIA.
- IRREGULAR ASTIGMATISM BILLED IN THE PRIMARY POSITION AS THE CHIEF MEDICAL COMPLAINT DOES NOT MEET NCL COVERAGE CRITERIA. IRREGULAR ASTIGMATISM IS A CONDITION CAUSED BY OTHER UNDERLYING DISORDERS.
- FEES BILLED TO VSP FOR ALL CONTACT LENS PLAN BENEFITS MUST BE CONSISTENT WITH YOUR U&C CHARGES, REGARDLESS OF THE PATIENT'S COVERAGE OR ALLOWANCES.

VSP[®] VISUALLY NECESSARY CONTACT LENSES

- TO SUBSTANTIATE BILLING FOR KERATOCONUS, BE SURE YOUR RECORDS INCLUDE: PATIENT HISTORY; K READINGS; BCVA WITH REFRACTION; SLIT LAMP EXAMINATION OF THE CORNEA; CORNEAL TOPOGRAPHY OR ANTERIOR OCT OF THE CORNEA.
- ENSURE THAT YOUR MEDICAL RECORDS ACCURATELY SUPPORT THE DIAGNOSIS SUBMITTED ON THE CLAIM WHEN BILLING FOR VISUALLY NECESSARY CONTACT LENSES. BY DOING SO YOUR PAYMENT WILL NOT BE DENIED IF THE DIAGNOSIS BILLED IS SUBSTANTIATED BY THE CLINICAL FINDINGS DOCUMENTED IN THE PATIENT'S RECORD.
- FAILURE TO RECORD YOUR CONTACT LENS EVALUATIONS, FITTINGS AND FOLLOW-UPS MAY RESULT IN THE DENIAL OF PAYMENT FOR SERVICES.
- DO NOT BALANCE BILL YOUR PATIENT THE DIFFERENCE BETWEEN VSP'S ALLOWED AMOUNTS AND YOUR U&C FEES FOR MATERIALS. EXAM AND MATERIAL (SPECTACLE LENSES AND FRAME) COPAYS APPLY UNLESS OTHERWISE SPECIFIED. ANY FITTING FEES INCURRED AFTER THE INITIAL 90 DAY PERIOD ARE CONSIDERED A PRIVATE MATTER BETWEEN YOU AND THE PATIENT.

VSP[®] VISUALLY NECESSARY CONTACT LENSES

- FILE ON E-CLAIM
- FOR ANISOMETROPIA AND HIGH AMMETROPIA, PROVIDE THE SPECTACLE RX
- FOR SCLERAL LENSES, USE HCPCS V2531
 - DO NOT USE THE V2530; ONLY USE THE V2531
- BILL HYBRID LENSES WITH HCPCS V2599
- FOR SCLERAL AND HYBRID LENSES, PROVIDE THE BRAND AND TYPE IN BOX 19
 - STATE WHETHER OR NOT THE LENS IS A “SCLERAL” OR HYBRID”
 - PROVIDE THE MANUFACTURER AND THE BRAND
- USE THE V2599 FOR LENSES THAT DO NOT HAVE A HCPCS CODE
 - HAND PAINTED LENSES, ETC.

VSP[®] VISUALLY NECESSARY CONTACT LENSES

- PIGGYBACK BENEFIT IS AVAILABLE FOR A PATIENT WHO MEETS THE PREVIOUSLY DISCUSSED CRITERIA, AND WHO IS INTOLERANT OF GP LENSES
 - PROVIDE INFORMATION ON PIGGYBACK LENS IN BOX 19
- SPECTACLE LENSES TO WEAR OVER CONTACTS BENEFIT
 - APHAKIA
 - HIGH AMMETROPIA $\geq 10.00D$
 - PRESBYOPIA
 - ACCOMMODATIVE DISORDER
 - BINOCULAR FUNCTION DISORDER
 - DIFFERENT PRISM REQUIREMENTS FOR DISTANCE AND NEAR
 - PRESCRIPTION REQUIRED
 - CALL VSP[®] (800-615-1883) FOR CLAIM NUMBER
 - 30 DAY TIME LIMIT
- 85% OF USUAL AND CUSTOMARY CHARGES FOR “CONTACT LENS EXAM SERVICES (FITTING AND EVALUATION)”

VSP[®] : VISUALLY NECESSARY CONTACT LENSES

- THE BASIC EXAMINATION IS BILLED AND PAYABLE PER THE TERMS OF THE PLAN
- VSP REIMBURSES 85% OF USUAL AND CUSTOMARY CHARGES FOR “CONTACT LENS EXAM SERVICES (FITTING AND EVALUATION)”
- VSP REIMBURSES USUAL AND CUSTOMARY FEES FOR MATERIALS UP TO THE PLAN LIMITS
 - TWO SCHEDULES ON PLAN LIMITS
 - COVERED AND BASE VISUALLY NECESSARY CL MAXIMUMS
 - VISUALLY NECESSARY CL SPECIALTY MAXIMUMS
 - SERVICE DRIVEN OR DIAGNOSIS DRIVEN (SEE CHART)
 - MUST BILL 92072, 92311, OR 92312 OR ONE OF THE DIAGNOSES
- THE PATIENT IS RESPONSIBLE FOR EXAM AND MATERIAL COPAYMENTS

VSP[®] VISUALLY NECESSARY CONTACT LENSES

Covered and Base Visually Necessary Contact Lens Maximums			
HCP	Annual Replacement¹	Planned Replacement¹	Daily Replacement¹
V2500*	\$251	—	—
V2501*	\$251	—	—
V2502*	\$385	—	—
V2503*	\$491	—	—
V2510*	\$405	—	—
V2511*	\$450	—	—
V2512*	\$650	—	—
V2513*	\$750	—	—
V2520	\$500	—	—
V2521	\$375	\$525	\$750
V2522	\$525	\$650	\$810
V2523	\$537	\$650	\$1000
V2530*	\$475	\$600	\$625
V2531*	\$499	—	—
V2599**	\$987	—	—
Piggyback	\$1,150	\$1,500	—

VSP[®] VISUALLY NECESSARY CONTACT LENSES

Visually Necessary Contact Lens Specialty Maximums			
HCPCS	Annual Replacement¹	Planned Replacement¹	Daily Replacement¹
V2500*	\$451	—	—
V2501*	\$585	—	—
V2502*	\$691	—	—
V2503*	\$605	—	—
V2510*	\$657	—	—
V2511*	\$800	—	—
V2512*	\$900	—	—
V2513*	\$825	—	—
V2520	\$500	\$650	—
V2521	\$679	\$804	—
V2522	\$750	\$863	—
V2523	\$650	\$775	\$800
V2530*	\$700	—	—
V2531*	\$2,300	—	—
V2599**	\$1,300	\$1,650	—
Piggyback	\$1,300	\$1,650	—

VSP[®] VISUALLY NECESSARY CONTACT LENSES

¹Annual Replacement is 1-2 units. Planned Replacement is 3-360 units. Daily Replacement is 361+ units.

*These services shouldn't be billed for more than 2 units. If billed with higher unit counts, we'll pay up to the Annual Replacement lens maximum.

**These services shouldn't be billed for more than 360 units. If billed with higher unit counts, we'll pay up to the Planned Replacement lens maximum.

***Effective 2/6/2012, maximum reimbursement increased to \$2,300. For dates of service between 10/1/2011 and 2/5/2012 maximum reimbursement is \$1,300.

****As of 7/16/2012, V2520, V2521, and V2522 with units of 361+ are not covered under the Specialty Maximums. For dates of service between 10/1/2011 to 7/15/2012 maximum reimbursement is: V2520= \$698; V2521= \$833; V2522= \$950.



CHANGE TO VSP NECESSARY CONTACT LENS BENEFIT

- **BEGINNING JUNE 1, 2024**, AN IMPROVEMENT IN BEST CORRECTED VISUAL ACUITY (BCVA) BY TWO LINES COMPARED TO SPECTACLES IS REQUIRED FOR VISUALLY NECESSARY CONTACT LENSES SPECIALTY CONDITIONS. BCVA FINDINGS FOR SPECIALTY CONDITIONS MUST BE RECORDED ON THE PATIENT'S MEDICAL EXAM RECORDS AND DEMONSTRATE A TWO-LINE IMPROVEMENT COMPARED TO SPECTACLES AND ARE SUBJECT TO REVIEW AND AUDIT. CONDITIONS NOTATED WITH "***" ARE EXCLUDED FROM THE BCVA REQUIREMENT.
- IF BILLING WITH CPT CODE 92072*, 92310* 92311*, 92312* OR 92313* – FOR ONE OF THESE DIAGNOSIS CODES:
- *CODES MAY NOT BE BILLED TOGETHER ON THE SAME CLAIM.



eye
Med

EYEMED™ MEDICALLY NECESSARY CONTACT LENS BENEFIT

- CLICK [HTTPS://EYEMED.COM/EN-US/PROVIDER](https://eyemed.com/en-us/provider) LOG INTO SITE
- CLICK ON “PROVIDER LOG IN”
- CLICK ON “SIGN IN”
- INPUT YOUR USERNAME AND PASSWORD
- CLICK ON “PROVIDER MANUAL,” AND HIT “CONTINUE”
- THEN, IN [WWW.EYEMEDINFOOCUS.COM](http://www.eyemedinfoocus.com), CLICK “PROVIDER MANUAL”
- THEN CLICK “SERVICES AND MATERIALS” FOR THE DROP DOWN, AND CLICK “MEDICALLY NECESSARY CONTACT LENS BENEFITS”

EYEMED™ MEDICALLY NECESSARY CONTACT LENS BENEFIT

- ANISOMETROPIA $\geq 3.00D$
- HIGH AMETROPIA $\geq +/- 10.00D$
- KERATOCONUS
- VISION IMPROVEMENT OTHER THAN KERATOCONUS FOR MEMBERS WHOSE VISION CAN BE CORRECTED BY TWO LINES ON THE VISUAL ACUITY CHART WHEN COMPARED TO THE BEST CORRECTED STANDARD SPECTACLE LENSES.
- PEDIATRIC ANIRIDIA (CA ONLY)
- PEDIATRIC APHAKIA (CA ONLY)
- PEDIATRIC CORNEAL DISORDER OR POST-TRAUMATIC DISORDER (CA HEALTH NET)
- PEDIATRIC PATHOLOGICAL MYOPIA (CA HEALTH NET)

EYEMED™ MEDICALLY NECESSARY CONTACT LENS BENEFIT

- KERATOCONUS

- **EMERGING/MILD:** CONTACT LENSES IN THIS TIER ARE ANTICIPATED TO INCLUDE, HOWEVER NOT BE LIMITED TO, SCLERAL, SEMI-SCLERAL AND HYBRID DESIGNS/MATERIALS. THE BELOW SEVERITY SCALE APPLIES: MULTIPLE SPECTACLE REMAKES
- UNSTABLE TOPOGRAPHY
- LIGHT SENSITIVITY/GLARE ISSUES
- SIGNS INCLUDING FLEISCHER RING, VOGT'S STRIAE AND SCISSOR REFLEX WITH RETINOSCOPY
- NO SCARRING
- TOPOGRAPHY (STEEP K <53D)
- CORNEAL THICKNESS >475 MICRONS

EYEMED™ MEDICALLY NECESSARY CONTACT LENS BENEFIT

- KERATOCONUS

- **MODERATE/SEVERE:** PATIENTS WHO BEGIN IN THE EMERGING OR MILD CATEGORIES AND ARE NOT SUCCESSFUL WITH CONTACT LENS MATERIALS AND KERATOCONUS DESIGNS MAY BE ELEVATED INTO THIS MODERATE/SEVERE TIER. CONTACT LENSES IN THIS TIER ARE ANTICIPATED TO INCLUDE HOWEVER NOT BE LIMITED TO SCLERAL, SEMI-SCLERAL AND HYBRID DESIGNS/MATERIALS. PATIENTS WHO QUALIFY AS MODERATE/SEVERE WILL HAVE ALL OF THE EMERGING/MILD SYMPTOMS, PLUS MILD TO NO SCARRING OR SOME SCARRING
- TOPOGRAPHY (STEEP K OF 53D OR HIGHER)
- CORNEAL THICKNESS UP TO 475 MICRONS
- REFRACTION NOT MEASURABLE

EYEMED™ MEDICALLY NECESSARY CONTACT LENS BENEFIT

- ONE BENEFIT PER CALENDAR YEAR
- CALL 888-581-3648 FOR AUTHORIZATION
- REPORT ON A EYEMED NECESSARY CONTACT LENS FORM
(DOWNLOAD) AND FAX TO 866-293-7373

EYEMED™ MEDICALLY NECESSARY CONTACT LENS BENEFIT

Qualifying Criteria	Contracted Provider Reimbursement
Anisometropia	95% of U&C up to \$700
High Ammetropia	95% of U&C up to \$700
Keratoconus	95% of U&C up to \$1,200 (Mild/Moderate) 95% of U&C up to \$2,500 (Advanced/Ectasia)
Vision Improvement	95% of U&C up to \$2,500

EYEMED™ MEDICALLY NECESSARY CONTACT LENS BENEFIT

Qualifying Criteria (Only in CA for Pediatric Plan)	Contracted Provider Reimbursement
Pediatric Aniridia	95% of U&C up to \$3,730
Pediatric Aphakia	95% of U&C up to \$5,800
Pediatric Corneal & Post-Trauma Disorder (Billed as Visual Improvement)	95% of U&C up to \$2,500
Pediatric Pathological Myopia	95% of U&C up to \$700

EYEMED™ MEDICALLY NECESSARY CONTACT LENS BENEFIT

Qualifying Criteria	Non-Standard Medically Necessary Contact Lens Codes*
Anisometropia	92310AN
High Ametropia	92310HA
Keratoconus	92072
Vision Improvement	92310VI
Pediatric Aniridia	92310AI
Pediatric Aphakia	92310AP
Pediatric Corneal Post-Trauma Disorder	92310VI
Pediatric Pathological Myopia	92310PM

EYEMED™ MEDICALLY NECESSARY CONTACT LENS CLAIM FORM

First American Administrators, Inc.
A wholly owned subsidiary of EyeMed Vision Care, LLC.
Medically Necessary Contact Lens In-network Claim Form

Instructions: Complete this form and fax it to 866.293.7373, or mail to EyeMed Vision Care, P.O. Box 8504, Cincinnati, OH 45240. All fields required unless noted.

Patient Information

Last Name	First Name	Middle Initial
Street Address	City	State Zip Code
Birth Date (MM/DD/YYYY)	Telephone Number with area code	
Relationship to subscriber (check one) <input type="checkbox"/> Self <input type="checkbox"/> Spouse <input type="checkbox"/> Child <input type="checkbox"/> Other		
Date of Service (MM/DD/YYYY)	Group Name	
Group Number	Patient Member ID # (if applicable)	
Subscriber Information (if information differs from patient)		
Last Name	First Name	Middle Initial
Street Address	City	State Zip Code
Birth Date (MM/DD/YYYY)	Telephone Number with area code	
Provider Information		
Provider Attestation: By signing below, I attest that the patient meets the requirements to receive medically necessary contact lenses per the criteria on this form, and that the patient is unable to achieve adequate functional vision without contact lenses.		
Servicing location name and address		
Provider Tax ID Number	Date submitted	
Servicing Provider Name (printed)	Provider Signature	

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Medically Necessary Contact Lens Claim Form (continued)

Medically Necessary Qualifying Conditions

Provider: Benefit covers contact lens evaluation, fit & follow-up and materials. Check only 1 box next to the condition that applies according to the final prescription. Check or fill in the applicable ICD-10 code. Enter your retail price for the services and materials.

<input type="checkbox"/> <i>Check here</i> Anisometropia 92310AN ICD-10 code H52.31 Select if Rx differs by at least 3D in meridian powers between the 2 eyes Check appropriate ICD-10 code: \$ _____ Enter retail price	<input type="checkbox"/> <i>Check here</i> High ametropia 92310HA Select if Rx exceeds plus or minus 10D meridian powers in either eye Check appropriate ICD-10 code: \$ _____ Enter retail price	<input type="checkbox"/> <i>Check here</i> Keratoconus - mild/moderate 92072 Select when keratoconus is present and Rx is not correctable to 20/25 in either or both eyes with spectacles Check appropriate ICD-10 code: \$ _____ Enter retail price	<input type="checkbox"/> <i>Check here</i> Keratoconus - advanced/ectasia 92072AD Select when keratoconus is present and one or more of the following conditions are met: • Corneal scarring • Steep K of 53D or higher • Corneal thickness <= 475 microns • Refraction not measurable Check appropriate ICD-10 code: \$ _____ Enter retail price
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ICD-10 code: H52.31

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Medically Necessary Qualifying Conditions (continued)

Check here

Vision improvement
92310VI
Keratoconus is absent
 Select for members whose vision can be improved by 2 lines on the visual acuity chart when compared to best corrected standard spectacle lenses

ICD-10 code:
 Check here _____ **Enter code**

\$ _____ **Enter retail price**

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EYEMED™ MEDICALLY NECESSARY CONTACT LENS CLAIM FORM

First American Administrators, Inc.
 A wholly owned subsidiary of EyeMed Vision Care, LLC.
**Medically Necessary Contact Lens
 In-network Claim Form**



Instructions: Complete this form and fax it to 866.293.7373, or mail to EyeMed Vision Care, P.O. Box 8504, Cincinnati, OH 45040. All fields required unless noted.

Patient Information			
Last Name	First Name	Middle Initial	
Street Address	City	State	Zip Code
Birth Date (MM/DD/YYYY)	Telephone Number with area code		
Relationship to subscriber (check one) <input type="checkbox"/> Self <input type="checkbox"/> Spouse <input type="checkbox"/> Child <input type="checkbox"/> Other			
Date of Service (MM/DD/YYYY)			
Group Name	Group Number		
Patient Member ID # (if applicable)			
Subscriber Information (if information differs from patient)			
Last Name	First Name	Middle Initial	
Street Address	City	State	Zip Code
Birth Date (MM/DD/YYYY)	Telephone Number with area code		
Provider Information			
Provider Attestation: By signing below, I attest that the patient meets the requirements to receive medically necessary contact lenses per the criteria on this form, and that the patient is unable to achieve adequate functional vision without contact lenses.			
Servicing location name and address			
Provider Tax ID Number	Date submitted		
Servicing Provider Name (printed)	Provider Signature		

EYEMED™ MEDICALLY NECESSARY CONTACT LENS CLAIM FORM

Medically Necessary Contact Lens Claim Form (continued)

Medically Necessary Qualifying Conditions

Provider: Benefit covers contact lens evaluation, fit & follow-up and materials. Check only 1 box next to the condition that applies according to the final prescription. Check or fill in the applicable ICD-10 code. Enter your retail price for the services and materials.

<p><input type="checkbox"/> <i>Check here</i> Anisometropia 92310AN ICD-10 code H52.31</p> <p>Select if Rx differs by at least 3D in meridian powers between the 2 eyes</p> <p>\$ _____ Enter retail price</p> <p>ICD-10 code: H52.31</p>	<p><input type="checkbox"/> <i>Check here</i> High ametropia 92310HA</p> <p>Select if Rx exceeds plus or minus 10D meridian powers in either eye</p> <p>Check appropriate ICD-10 code:</p> <p>Hypermetropia <input type="checkbox"/> H52.01 <input type="checkbox"/> H52.02 <input type="checkbox"/> H52.03</p> <p>Myopia <input type="checkbox"/> H52.11 <input type="checkbox"/> H52.12 <input type="checkbox"/> H52.13</p> <p>\$ _____ Enter retail price</p>	<p><input type="checkbox"/> <i>Check here</i> Keratoconus - mild/moderate 92072</p> <p>Select when keratoconus is present and Rx is not correctable to 20/25 in either or both eyes with spectacles</p> <p>Check appropriate ICD-10 code:</p> <p><input type="checkbox"/> H18.601 <input type="checkbox"/> H18.602 <input type="checkbox"/> H18.603 <input type="checkbox"/> H18.609 <input type="checkbox"/> H18.611 <input type="checkbox"/> H18.612 <input type="checkbox"/> H18.613 <input type="checkbox"/> H18.619</p> <p>\$ _____ Enter retail price</p>	<p><input type="checkbox"/> <i>Check here</i> Keratoconus - advanced/ectasia 92072AD</p> <p>Select when keratoconus is present and one or more of the following conditions are met:</p> <ul style="list-style-type: none"> • Corneal scarring • Steep K of 53D or higher • Corneal thickness <= 475 microns • Refraction not measurable <p>Check appropriate ICD-10 code:</p> <p><input type="checkbox"/> H18.621 <input type="checkbox"/> H18.622 <input type="checkbox"/> H18.623 <input type="checkbox"/> H18.629 <input type="checkbox"/> H18.711 <input type="checkbox"/> H18.712 <input type="checkbox"/> H18.713 <input type="checkbox"/> H18.719</p> <p>\$ _____ Enter retail price</p>
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EYEMED™ MEDICALLY NECESSARY CONTACT LENS CLAIM FORM

Medically Necessary Qualifying Conditions (continued)

Check here

Vision improvement

92310VI

Keratoconus is absent

Select for members whose vision can be improved by 2 lines on the visual acuity chart when compared to best corrected standard spectacle lenses

ICD-10 code:

Check here _____ Enter code

\$ _____ Enter retail price



EYEMED “OPERATIONAL UPDATE”

EFFECTIVE MAY 1, 2024, WHEN SUBMITTING MEDICALLY NECESSARY CONTACT LENS (MNCL) CLAIMS, ADDITIONAL SUPPORTING DOCUMENTS MUST ALSO BE SUBMITTED SO THAT WE MAY CONFIRM MEMBER ELIGIBILITY FOR THE BENEFIT.* A REVIEW FOR AN MNCL CLAIM IS ADMINISTRATIVE IN NATURE – DONE ONLY TO DETERMINE WHETHER THE CLAIM SUBMISSION IS COMPLETED ACCURATELY AND ALIGNS WITH THE BASIC COVERAGE PARAMETERS. IT IS NOT A DETERMINATION OF MEDICAL NECESSITY AND REVIEWERS DO NOT ASSESS THE CLINICAL JUDGEMENT OF THE PROVIDER. PLEASE ENSURE THAT ALL MNCL CLAIM SUBMISSIONS STARTING ON 5/1 INCLUDE THE FOLLOWING:

1. POINT OF SALE DOCUMENTATION OR A RECEIPT ISSUED TO THE MEMBER. THIS MUST SHOW AN ITEMIZED LIST OF SERVICES, MATERIALS, AND CHARGES.
2. THE SIGNED EXAM RECORD FROM THE INITIAL EXAM AND CONTACT LENS EVALUATION INCLUDING THE DETAILED PARAMETERS OF THE CONTACT LENS TO BE DISPENSED.

THE UPDATED EYEMED MNCL FORM CAN BE FOUND ON INFOCUS STARTING ON 4/30 AND MUST BE FAXED OR MAILED TO THE ADDRESSES LISTED AT THE TOP OF THE FORM ALONG WITH THE SUPPORTING DOCUMENTS. SINCE PLAN INFORMATION DIFFERS BASED ON MEMBER ELIGIBILITY, WE RECOMMEND YOU USE THE ONLINE CLAIMS SYSTEM TO DETERMINE THE VISION CARE SERVICES MEMBERS ARE ELIGIBLE TO RECEIVE BEFORE COMPLETING YOUR MNCL CLAIMS SUBMISSION.

*THIS UPDATED PROCESS ONLY APPLIES WHEN SUBMITTING THE STANDARD MNCL FORM. YOU WILL CONTINUE TO FOLLOW YOUR CURRENT MNCL CLAIMS SUBMISSION PROCESS FOR ANY CLIENT-SPECIFIC OR MEDICAID STATE-SPECIFIC MNCL FORMS.



United
Healthcare

spectera[®]

SPECTERA[®] NECESSARY CONTACT LENSES BENEFIT

- GO TO WWW.SPECTERA.COM/
- LOG IN
- SELECT “PLAN RESOURCES”
- SELECT “NETWORK ADMINISTRATION MANUAL”
- GO TO PAGE 9, READ THROUGH THIS PARAGRAPH, AND SELECT “BILLING GUIDE”
- BILLING GUIDE FOR NECESSARY CONTACT LENSES IS ON PAGE 43

SPECTERA[®] NECESSARY CONTACT LENS BENEFIT POLICY

NECESSARY CONTACTS ARE COVERED IN FULL FOR MEMBERS AFTER ANY APPLICABLE COPAY. CLAIMS FOR NECESSARY CONTACTS MUST BE SUBMITTED PER THE INSTRUCTIONS IN OUR BILLING GUIDE. REIMBURSEMENT RATES FOR NECESSARY CONTACT LENS FITTING AND EVALUATION SERVICES ARE CAPPED AT \$500. REIMBURSEMENT RATES FOR NECESSARY CONTACT LENSES ARE CAPPED AT \$1,500. IF YOUR COSTS EXCEED THE CONTRACTED REIMBURSEMENT AMOUNT, COMPLETE THE SUPPORTING DOCUMENTATION FORM— NECESSARY CONTACT LENSES AND SERVICES AND INCLUDE DOCUMENTATION OF YOUR ACTUAL ACQUISITION COST. AN INVOICE OR ORDER FORM RECEIPT IS ACCEPTABLE DOCUMENTATION. TOTAL PAYMENT WILL NOT EXCEED 125% OF ACQUISITION COST OF THE NECESSARY CONTACT LENSES, LESS ANY MEMBER EXPENSES. APPROVALS WILL BE BASED ON REVIEW OF THE COMPLETED FORM AND THE ORIGINAL CLAIM.

SPECTERA[®] NECESSARY CONTACT LENS BENEFIT POLICY

NECESSARY CONTACTS ARE COVERED IN FULL FOR MEMBERS AFTER ANY APPLICABLE COPAY. CLAIMS FOR NECESSARY CONTACTS MUST BE SUBMITTED PER THE INSTRUCTIONS IN OUR BILLING GUIDE. REIMBURSEMENT RATES FOR NECESSARY CONTACT LENS FITTING AND EVALUATION SERVICES ARE CAPPED AT \$500. REIMBURSEMENT RATES FOR NECESSARY CONTACT LENSES ARE CAPPED AT \$1,500. IF YOUR COSTS EXCEED THE CONTRACTED REIMBURSEMENT AMOUNT, COMPLETE THE SUPPORTING DOCUMENTATION FORM— NECESSARY CONTACT LENSES AND SERVICES AND INCLUDE DOCUMENTATION OF YOUR ACTUAL ACQUISITION COST. AN INVOICE OR ORDER FORM RECEIPT IS ACCEPTABLE DOCUMENTATION. TOTAL PAYMENT WILL NOT EXCEED 125% OF ACQUISITION COST OF THE NECESSARY CONTACT LENSES, LESS ANY MEMBER EXPENSES. APPROVALS WILL BE BASED ON REVIEW OF THE COMPLETED FORM AND THE ORIGINAL CLAIM.

SPECTERA[®] NECESSARY CONTACT LENS BENEFIT POLICY

NECESSARY CONTACTS ARE COVERED IN FULL FOR MEMBERS AFTER ANY APPLICABLE COPAY. CLAIMS FOR NECESSARY CONTACTS MUST BE SUBMITTED PER THE INSTRUCTIONS IN OUR BILLING GUIDE. REIMBURSEMENT RATES FOR NECESSARY CONTACT LENS FITTING AND EVALUATION SERVICES ARE CAPPED AT \$500. REIMBURSEMENT RATES FOR NECESSARY CONTACT LENSES ARE CAPPED AT \$1,500. **IF YOUR COSTS EXCEED THE CONTRACTED REIMBURSEMENT AMOUNT, COMPLETE THE SUPPORTING DOCUMENTATION FORM– NECESSARY CONTACT LENSES AND SERVICES AND INCLUDE DOCUMENTATION OF YOUR ACTUAL ACQUISITION COST.** AN INVOICE OR ORDER FORM RECEIPT IS ACCEPTABLE DOCUMENTATION. TOTAL PAYMENT WILL NOT EXCEED 125% OF ACQUISITION COST OF THE NECESSARY CONTACT LENSES, LESS ANY MEMBER EXPENSES. APPROVALS WILL BE BASED ON REVIEW OF THE COMPLETED FORM AND THE ORIGINAL CLAIM.

SPECTERA[®] NECESSARY CONTACT LENS BENEFIT POLICY

NECESSARY CONTACTS ARE COVERED IN FULL FOR MEMBERS AFTER ANY APPLICABLE COPAY. CLAIMS FOR NECESSARY CONTACTS MUST BE SUBMITTED PER THE INSTRUCTIONS IN OUR BILLING GUIDE. REIMBURSEMENT RATES FOR NECESSARY CONTACT LENS FITTING AND EVALUATION SERVICES ARE CAPPED AT \$500. REIMBURSEMENT RATES FOR NECESSARY CONTACT LENSES ARE CAPPED AT \$1,500. IF YOUR COSTS EXCEED THE CONTRACTED REIMBURSEMENT AMOUNT, COMPLETE THE SUPPORTING DOCUMENTATION FORM— NECESSARY CONTACT LENSES AND SERVICES AND INCLUDE DOCUMENTATION OF YOUR ACTUAL ACQUISITION COST. AN INVOICE OR ORDER FORM RECEIPT IS ACCEPTABLE DOCUMENTATION. TOTAL PAYMENT WILL NOT EXCEED 125% OF ACQUISITION COST OF THE NECESSARY CONTACT LENSES, LESS ANY MEMBER EXPENSES. APPROVALS WILL BE BASED ON REVIEW OF THE COMPLETED FORM AND THE ORIGINAL CLAIM.

UNITED HEALTHCARE™ / SPECTERA® MEDICALLY NECESSARY CONTACT LENS CLAIM FORM



Supporting Documentation Form – Necessary Contact Lenses (In-Network Use)

Member Information

Member name: _____
Member ID #: _____ DOB: _____
Encounter #: _____

Additional Payment Requested for:

Necessary Contact Lenses

Necessary Contact Lenses

Please include documentation of your actual acquisition cost. An invoice or order form receipt is acceptable documentation.

I, _____ (print full name of practitioner), hereby attest that this information is true, accurate and complete to the best of my knowledge.

Practitioner signature: _____ Date: _____

Submit completed form to:

Fax: UnitedHealthcare | Spectera Claims
(877) 410-2519

Mail: UnitedHealthcare | Spectera Claims
PO Box 30978
Salt Lake City, UT 84130


SPECTERA[®] MANUAL, PAGE 43

Network Administration Manual | Section 13: Codes

92071	XC	
92310 to 92317		<p>Necessary contact lenses fit/eval In order to process a necessary contact lens fit, you must bill with the XC modifier and the member must have one or more of the conditions noted below. Always code to the highest degree of specificity when indicating diagnosis. The following is a list of acceptable diagnosis codes:</p> <p>Keratoconus: H18.601 thru H18.629</p> <p>Irregular corneal astigmatism: H52.211 thru H52.219</p> <p>Aphakia: H27.00 thru H27.03, Q12.3</p> <p>Anisometropia or aniseikonia: H52.31, H52.32</p> <p>Corneal deformity: Q13.3, Q13.4, H18.70, H18.721 thru H18.799</p> <p>Corneal opacity: H17.00 thru H17.13, H17.611 thru H17.629, H17.69, H17.9</p> <p>Corneal degeneration: H18.40, H18.421 thru H18.469, H18.49</p> <p>Corneal ectasia: H18.711 thru H18.719</p> <p>Corneal transplant: Z94.7, T86.8401 thru T86.8499</p> <p>Disorder of refraction: H52.7 (This covers cases where vision is less than 20/70 with glasses but can be improved to better than 20/70 with contact lenses.)</p> <p>Facial deformity: M95.0, M95.2, Q67.0, Q67.1, Q18.0 thru Q18.9, Q75.0 thru Q75.9</p> <p>Hereditary corneal degenerations: H18.501 thru H18.599</p> <p>Order specified corneal disorders: H18.811 thru H18.829</p> <p>Other corneal disorders: H18.011 thru H18.019</p>



SPECTERA[®] MANUAL, PAGE 43

Network Administration Manual | Section 13: Codes



92071 92310 to 92317	XC	Necessary contact lenses fit/eval In order to process a necessary contact lens fit, you must bill with the XC modifier and the member must have one or more of the conditions noted below. Always code to the highest degree of specificity when indicating diagnosis. The following is a list of acceptable diagnosis codes: Keratoconus: H18.601 thru H18.629 Irregular corneal astigmatism: H52.211 thru H52.219 Aphakia: H27.00 thru H27.03, Q12.3 Anisometropia or aniseikonia: H52.31, H52.32 Corneal deformity: Q13.3, Q13.4, H18.70, H18.721 thru H18.799 Corneal opacity: H17.00 thru H17.13, H17.611 thru H17.629, H17.69, H17.9 Corneal degeneration: H18.40, H18.421 thru H18.469, H18.49 Corneal ectasia: H18.711 thru H18.719 Corneal transplant: Z94.7, T86.8401 thru T86.8499 Disorder of refraction: H52.7 (This covers cases where vision is less than 20/70 with glasses but can be improved to better than 20/70 with contact lenses) Facial deformity: M85.0, M85.2, Q67.0, Q67.1, Q18.0 thru Q18.9, Q75.0 thru Q75.9 Hereditary corneal degenerations: H18.501 thru H18.599 Order specified corneal disorders: H18.811 thru H18.829 Other corneal disorders: H18.011 thru H18.019
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PCA-1-20-04129-MarComm_BPOC_12012021
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92071 AND 92072 ON SPECTERA®

- THE MANUAL, AT PAGE 43, ONLY STATES THAT THE CPT CODE, 92071: (FITTING OF CONTACT LENS FOR THE TREATMENT OF OCULAR SURFACE DISEASE) AS THE ONLY APPROVED 9207X CODE. THIS NOTATION IS AN ERROR
- THE CPT CODE, 92072: (FITTING OF CONTACT LENS FOR MANAGEMENT OF KERATOCONUS, INITIAL FITTING) IS APPROVED BY SPECTERA®
- IT IS ALSO NECESSARY TO UNDERSTAND THAT SPECTERA® ALSO COVERS THE CPT 92071: (FITTING OF CONTACT LENS FOR THE TREATMENT OF OCULAR SURFACE DISEASE)

SPECTERA[®] LIMITED DATA SET

- KERATOCONUS: H18.601 THROUGH H18.629
- IRREGULAR CORNEAL ASTIGMATISM: H52.211 THROUGH H52.219
- APHAKIA: H27.00 THROUGH H27.03, Q12.3
- ANISOMETROPIA OR ANISEIKONIA: H52.31, H52.32
- CORNEAL DEFORMITY: Q13.3, Q13.4, H18.70, H18.721 THROUGH H18.799
- CORNEAL OPACITY: H17.00 THROUGH H17.13, H17.811 THROUGH H17.829, H17.89, H17.9

SPECTERA[®] LIMITED DATA SET

- CORNEAL DEGENERATION: H18.40, H18.421 THROUGH H18.469, H18.49
- CORNEAL ECTASIA: H18.711 THROUGH H18.719
- CORNEAL TRANSPLANT: Z94.7, T86.8401 THROUGH T86.8499
- DISORDER OF REFRACTION: H52.7 (THIS COVERS CASES WHERE VISION IS LESS THAN 20/70 WITH GLASSES BUT CAN BE IMPROVED TO BETTER THAN 20/70 WITH CONTACT LENSES.)
- FACIAL DEFORMITY: M95.0, M95.2, Q67.0, Q67.1, Q18.0 THROUGH Q18.9, Q75.0 THROUGH Q75.9
- HEREDITARY CORNEAL DEGENERATIONS: H18.501 THROUGH H18.599
- OTHER-SPECIFIED CORNEAL DISORDERS: H18.811 THROUGH H18.829
- OTHER CORNEAL DISORDERS: H18.011 THROUGH H18.019

SPECTERA[®] NECESSARY CONTACT LENS MODIFIERS

- SPECTERA[®] REQUIRES THE APPLICATION OF THE “-XC” MODIFIER BE APPENDED TO BOTH THE SERVICES AND THE MATERIALS TO QUALIFY AS PART OF THE NECESSARY CONTACT LENS BENEFIT
- FOR ROUTINE CONTACT LENS SERVICES, ONE SHOULD USE:
 - “-CM” (COVERED SELECTION MONTHLY PLANNED REPLACEMENT [FORMULARY])
 - “-CD” (COVERED SELECTION DISPOSABLE CONTACTS/BI-WEEKLY AND DAILY WEAR [FORMULARY])
 - “-ND” (NON-SELECTION DISPOSABLE CONTACTS [NON-FORMULARY])



SUPERIOR VISION™ NON ELECTIVE/MEDICALLY NECESSARY CONTACT LENS BENEFIT

- GO TO WWW.SUPERIORVISION.COM
- CLICK “EYE CARE PROFESSIONAL LOG IN”
- LOG IN WITH USER NAME AND PASSWORD
- CLICK “PROVIDER RESOURCES” DOWN THE LEFT HAND SIDE
- CLICK “EMPLOYER GROUP”
- CLICK “FORMS AND PUBLICATIONS”
- CLICK ON “MEDICALLY NECESSARY CONTACT LENS CLAIM REIMBURSEMENT AUTHORIZATION FORM”

SUPERIOR VISION™ NON ELECTIVE/MEDICALLY NECESSARY CONTACT LENS BENEFIT

- EFFECTIVE JANUARY 1, 2023
- ONLY APPLIES TO THE SUPERIOR VISION COMMERCIAL LINE OF BUSINESS
- DOES NOT AFFECT THE DAVIS VISION LINE OF BUSINESS
- SUBJECT TO AUDIT

SUPERIOR VISION™ NON ELECTIVE/MEDICALLY NECESSARY CONTACT LENS BENEFIT

Condition	Max Allowable charge
Dry eye syndrome	Up to \$1,200
Keratitis	Up to \$700
Keratoconus (Unstable)	Up to \$2,500
Keratoconus (Stable)	Up to \$1,200
Pediatric Corneal Disorder & Post Traumatic Disorder	Up to \$700
Erosion	Up to \$700
Pediatric Aphakia	Up to \$700
Pediatric Pathological Myopia	Up to \$700

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SUPERIOR VISION™ NON ELECTIVE/MEDICALLY NECESSARY CONTACT LENS BENEFIT

Condition	Max Allowable charge
High Ametropia	Up to \$700
Hypermetropia	Up to \$700
Myopia	Up to \$700
Irregular Astigmatism	Up to \$1,000
Anisometropia	Up to \$700
Sjögren syndrome	Up to \$700
Vision Improvement	N/A
Congenital malformations of anterior segment of eye	Up to \$700
Pediatric Aniridia	Up to \$3,700
Injury of conjunctiva and corneal abrasion w/out foreign body	Up to \$700
Foreign body in cornea	Up to \$700

SUPERIOR VISION NON ELECTIVE/MEDICALLY NECESSARY CONTACT LENS BENEFIT

SUPERIOR VISION SERVICES, INC.
Non Elective / Medically Necessary Contact Lens Benefit
 Claim Reimbursement Pre-Determination Form

Fax to: (916) 859-6261

Today's Date: _____ DOS: ____/____/____
 Insured's Name: _____ I.D.#: _____
 Patient's Name: _____ Patient's DOB: _____
 City / State: _____ Employer: _____

Provider Info: Tax ID: _____
 Provider Name: _____ Practice Name: _____
 Address: _____ City/State: _____ / _____
 Phone: (____) _____ Fax: (____) _____

Definition: Contact lenses which are considered for the medically necessary conditions as described below. Reimbursement for these lenses will be according to the fee schedule for medically necessary contact lenses.

Please check the appropriate box indicating the patient's condition.

- | | |
|--------------------------|--|
| <input type="checkbox"/> | 1. Aphakia (after cataract surgery) A pair of single vision lenses or multi-focal lenses and frames can be provided with the contact lenses. |
| <input type="checkbox"/> | 2. When visual acuity cannot be corrected to 20/70 in the better eye except through the use of contact lenses (must be 20/60 or better) |
| <input type="checkbox"/> | 3. Anisometropia of 4.0 diopters or more, provided visual acuity improves to 20/60 or better in the weaker eye. |
| <input type="checkbox"/> | 4. Keratoconus: Please attach copy of Topography, K-Readings, & chart notes. |
| <input type="checkbox"/> | 5. Other: Please attach copy of written examination report to this form. |

Notes: _____

Superior Vision Response:

<input type="checkbox"/>	Approved for claim reimbursement at the rate of \$_____.	<input type="checkbox"/>	Member is responsible for the fitting fee.
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<input type="checkbox"/>	Member has covered fitting copy of \$_____ and is responsible for billed charges exceeding \$50 on the fit.	<input type="checkbox"/>	Denied for claim reimbursement Reason: _____ _____
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The claim may be submitted via the Superior Vision Website www.superiorvision.com or 1500 form. This document is for your records.

 Superior Vision Services, Inc. Telephone: **800-923-6766 x** _____ Date: _____

OTHER BILLING CONSIDERATIONS

- KNOW YOUR CHAIR COSTS (NOV, 2008 *SPECTRUM*)
- KNOW HOW MUCH TIME IT TAKES TO PRESCRIBE, ORDER, RECEIVE, DISPENSE, INSTRUCT, AND FOLLOW THROUGH ADAPTION EACH TYPE OF SPECIALTY LENS
- ADD YOUR PROFIT FOR A RATIONAL AND DEFENSIBLE INITIAL DISPENSING FEE
- CHARGE FOR FOLLOW UP VISITS AFTER THAT
- KNOW THE LENS COST, NUMBER OF LENSES PER EYE IT TAKES TO ACHIEVE SUCCESS, THE RETURN POLICY, AND THE DELIVERY COST OF EACH LENS
- ADD YOUR PROFIT FOR A RATIONAL AND DEFENSIBLE LENS FEE

FINAL THOUGHT

- THE GROSS PER PATIENT VISIT FOR PRESCRIBING SPECIALTY CONTACT LENSES, ESPECIALLY MEDICALLY NECESSARY LENSES, IS NEARLY TWICE THE NATIONAL AVERAGE FOR ALL OTHER TYPES OF EYE CARE
- THESE PATIENTS NEED GLASSES ALSO
- THESE PATIENTS HAVE OTHER MEDICAL CONDITIONS ALSO
 - GLAUCOMA
 - DRY EYE DISEASE
 - MACULAR DEGENERATION

CONCLUSIONS

- KNOW WHAT THE CONTRACTS SAY FOR EACH CONTRACT FOR EACH CODE THAT YOU USE IN YOUR OFFICE
- USE THE CORRECT CODES AND MODIFIERS TO MAXIMIZE THE REIMBURSEMENT FOR THE SERVICES RENDERED
- BILL APPROPRIATELY FOR ALL OF YOUR SERVICES—FORGET ABOUT “FITTING FEES”
- MAKE SURE THAT YOUR FEES ARE IN LINE WITH THE CONTRACTS THAT YOU HAVE SIGNED, BUT HIGH ENOUGH TO BE COMMENSURATE WITH THE COMPLEXITY, TIME, AND LIABILITY INVOLVED
- LEARN TO CONSULT WITH YOUR COLLEAGUES—IT WON’T HURT ONE BIT
- LEARN TO PROMOTE THIS ASPECT OF YOUR PRACTICE

CONCLUSIONS

- BE CONSISTENT
- HAVING THE RIGHT TOOLS—KNOW WHERE TO FIND THE INFORMATION, I.E., CODE BOOKS, CONTRACTS, ETC.
- DON'T BE A SLAVE TO THIRD PARTY PAYERS—YOU DECIDE WHAT TESTS AND PROCEDURES NEED TO BE DONE; THEY DECIDE WHAT THEY WILL PAY FOR
- COMMUNICATE WITH YOUR PATIENTS
- DON'T BE AFRAID TO APPEAL REJECTIONS OR SEND THIRD PARTY PAYERS TO COLLECTION (BE CAREFUL ABOUT THE ARBITRATION AGREEMENTS IN YOUR CONTRACTS)

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. They are located in the top-left, top-center, and bottom-right areas of the slide.

THANK YOU!

ANY QUESTIONS?

DRNEWMAN@DRNEWMAN.COM