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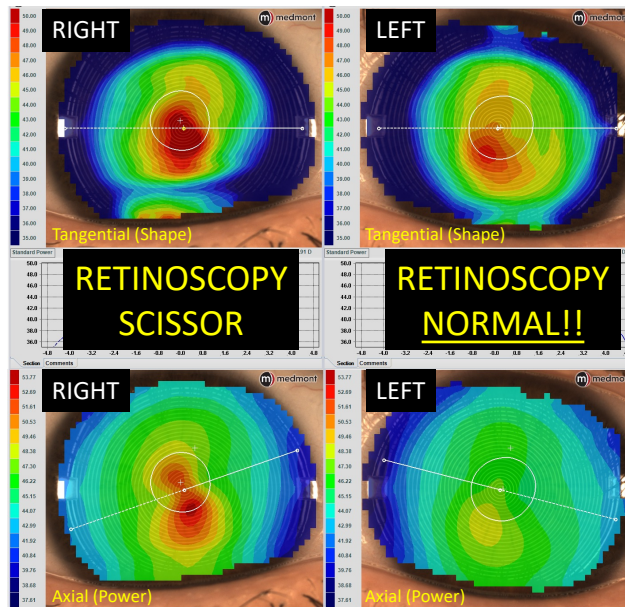
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Case History – Retinoscopy



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Case History – Retinoscopy

Discussion:

- 1. False environment not like practice
- 2 skilled practitioners familiar with retinoscopy screening patients for retinoscopy.

Retinoscopy as a Screening Tool for Keratoconus

Haiitham Al-Mahrouqi, BMedSc (Hons), MB ChB, Saif Bani Oraba, MD,† Shihab Al-Habsi, MD,‡ Noufal Mundemkattil, MSc,‡ Jithin Babu, MSc,‡ Sathiya M. Panchatcharam, MSc,* Rashid Al-Saidi, MD, FEBO,‡ and Abdulatif Al-Raisi, MD, FRCS§*

Purpose: To investigate the validity and reliability of retinoscopy in screening for keratoconus using the rotating Pentacam Scheimpflug camera as the gold standard comparison.

Methods: Patients between the ages of 10 and 30 years who were referred to the outpatient clinic with keratoconus, keratoconus suspect, reduced vision, eye discomfort or frequent change of glasses, or for refraction or refractive surgery, were screened by two independent and masked retinoscopists for the presence of scissoring reflex. Patients then underwent vision testing, slit lamp examination, and Pentacam imaging. A diagnosis of keratoconus by Pentacam was made if the final D index in the Belin and Ambrósio Display was ≥ 2.69 . The results of retinoscopy and Pentacam examinations were compared to assess the validity and reliability of the test.

Results: A total of 123 patients (67 male patients and 45 female patients) with a mean age of 21 years ± 5.6 (range 10–30 years) comprising 245 eyes were included. There were 87 eyes with keratoconus and 158 eyes without keratoconus. The prevalence of keratoconus was 26.4% in the study population. The prevalence of keratoconus was significantly higher in the study population than in the general population (1.5–2.0%). The prevalence of keratoconus was significantly higher in the study population than in the general population (1.5–2.0%).

Conclusions: Retinoscopy appears to be a very sensitive and reliable test for detecting keratoconus including early disease. Such a test may be implemented in population-based screening programs for keratoconus.

Keywords: Keratoconus, retinoscopy, screening, Pentacam, Scheimpflug camera, gold standard.



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Case History – Retinoscopy

Discussion:

- 1. False environment not like practice
- 2 skilled practitioners familiar with retinoscopy screening patients for retinoscopy.
- 2. Amsler-Krumeich classification.
- Ophthalmology based screening
- Visual field loss in glaucoma
- Retinal issues in myopia
- Ophthalmology doesn't detect early changes in a condition at the start of its understanding.

without keratoconus. Using the **Amsler–Krumeich classification**,

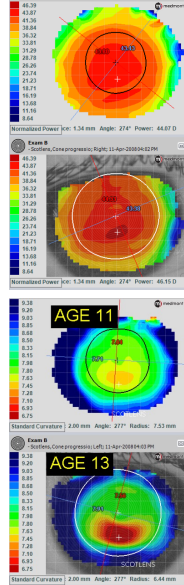
TABLE 1. Comparison of Spectacle-Corrected Distance Visual Acuity (SCDVA), Mean (Km) and Maximum (Kmax) Power of the Anterior Corneal Curvature, and Minimum Corneal Thickness Between the Eyes With and Without Keratoconus

	Keratoconus	Normal
	Median (25%–75% interquartile range)	Median (25%–75% interquartile range)
SCDVA (in LogMAR)	0.2 (0.0–0.3)	0.0 (0.0–0.0)
Km (in diopters)	45.8 (44.9–48.3)	43.5 (42.6–44.7)
Kmax (in diopters)	50.8 (47.9–55.0)	44.5 (43.5–46.0)
	Mean (SD)	
Minimum corneal thickness (in micrometers)	463 (38.8)	533 (38.2)



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Case History – Retinoscopy



AMSLER-KRUMEICH CLASSIFICATION (1938, MODIFIED 1998)

The Amsler-Krumeich (Table 7.2) is the oldest and most commonly used classification system. Corneas are graded according to severity of ectatic disease, ranging from stage 1 to 4, with 4 being the most severe. This system utilizes apex anterior corneal curvature, apex corneal thickness, manifest refraction, and presence or absence of corneal scarring.

TABLE 7.2
Amsler-Krumeich Classification of Keratoconus

Severity	K m (sim k, D)	Thickness (µm)	Myopia and Astigmatism (D)	Cornea
1	<48	>500	<5.00	Eccentric steepening, no central scars
2	48–53	400–500	5.00 to <8.00	No central scars
3	54–55	200–400	8.00 – 10.00	No central scars
4	>55	<200	Not measurable	Central scars

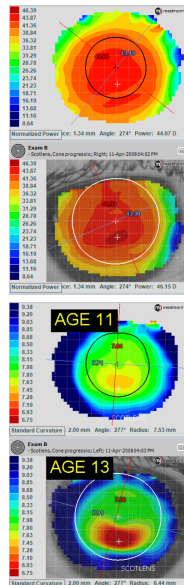
K m, Mean keratometry; *sim k*, simulated keratometry; µm, microns.



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Case History – Retinoscopy

GRADE
0
0
0
1



AMSLER-KRUMEICH CLASSIFICATION (1938, MODIFIED 1998)

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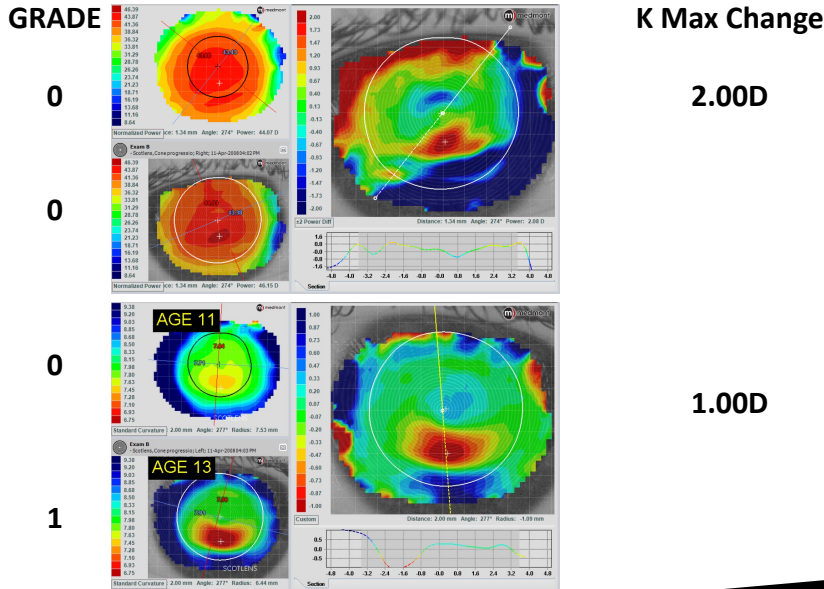
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Case History – Retinoscopy



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Paradox

Inclusion criteria for patients to be treated: (1 or more)

1. Confirmed progression (based on current understanding of Pentacam measurement repeatability limits).

Early KC ($K_{max} < 55D$)² K 6.20mm!! (1 or more)	Moderate/advanced KC ($K_{max} \geq 55D$)³ (1 or more)
<ul style="list-style-type: none"> ■ ≥ 1 D increase K_{max} ■ ≥ 1 D increase K_2 or K_1 front ■ ≥ 0.5 D increase back K_2 ■ $\geq 16 \mu m$ decrease minimum thickness 	<ul style="list-style-type: none"> ■ ≥ 2.5 D increase K_{max} ■ ≥ 2.5 D increase K_2 or K_1 front ■ $\geq 22 \mu m$ decrease minimum thickness

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Paradox

- Everyone has access to retinoscopy
- IF it is accepted retinoscopy is effective against screening for early keratoconus
- NO REASON to miss early keratoconus.
- Retinoscopy can't show comparative change
- K Max is treatment protocol it should also be referral protocol
- Mean K is 7.85 and you refer someone with Ks 7.35 (still grade 0)



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My mission:

If you are an EMPLOYER

- Please buy a topographer.
- Provide up to date screening, referral for your patients
- Provide your optometrists / CLOs efficient, accurate equipment

If you are an OPTOM / CLO

- Ask for a topographer
- Tell employer to watch this / contact me.

If you are an optometric body

- Screening is the value of optometry in the community



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Intro to OK Night Lenses – The Px Journey

CPD Lecture

1 Points 1 Hours

Clinical practice

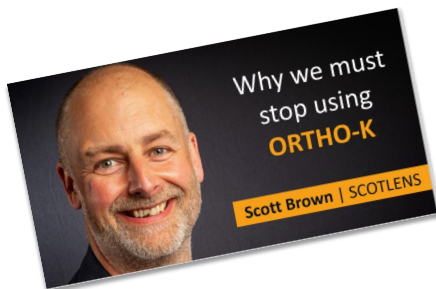
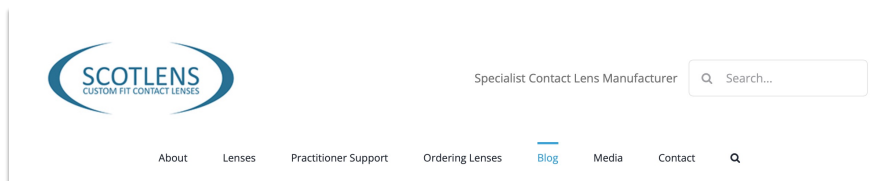
Understand the different fitting processes used in fitting different ortho-k lenses.
Understand the limitations, advantages and disadvantages of the fitting processes.
Understand how a basic ortho-k lens parameter correlates to the cornea.
Understand the refractive limitations of ortho-k with astigmatism.
Understand optimum technique for ortho-k (and therefor GP corneal) insertion and removal.
Understand the main care products available for ortho-k lenses and how they are used.

Specialty CPD - contact lens optician

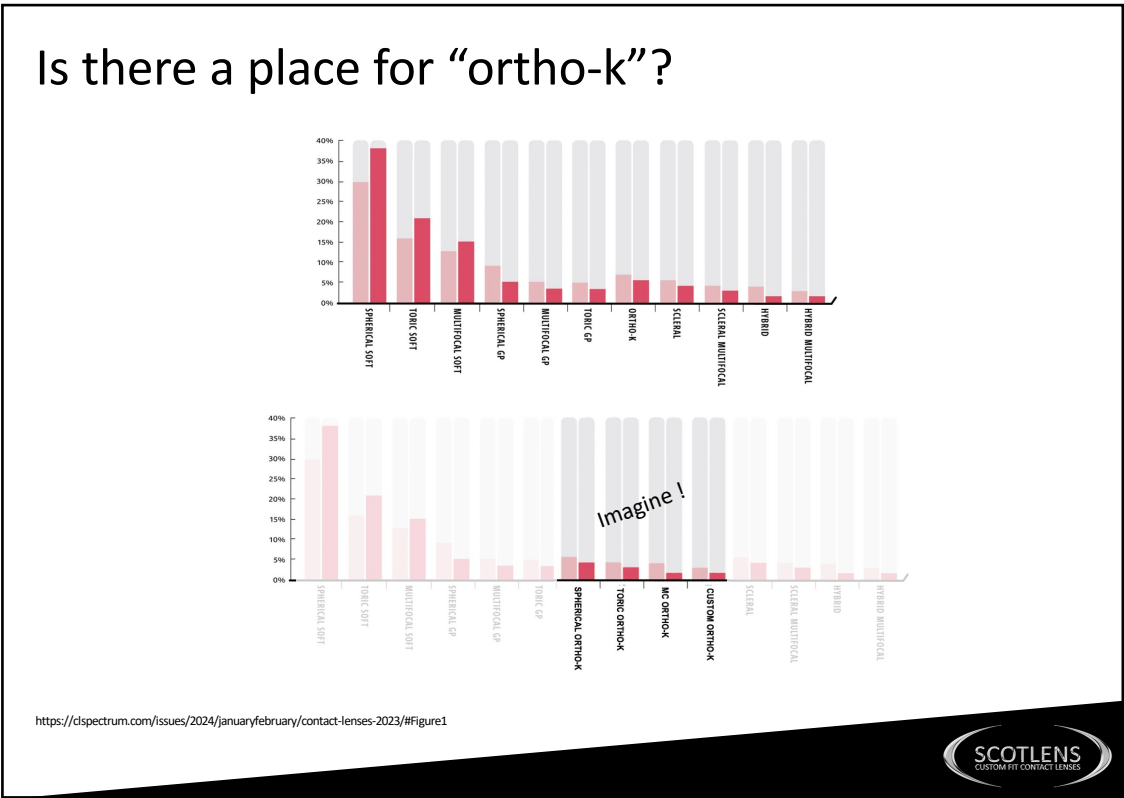
Understand optimum technique for ortho-k (and therefor GP corneal) insertion and removal.
Understand the main care products available for ortho-k lenses and how they are used.
Understand the symptoms and how solution toxicity can be identified, along with alterations to lens care that can benefit patients.



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35



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Is there a place for the term “ortho-k”?

Descriptive between professionals

<p>Like –</p> <p>Back surface concentric bifocal</p> <p>PRK / LASIK / LASEK</p>	<p>Vs</p> <p>bifocal CL</p> <p>Laser surgery</p>
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'Night Lenses'

Communicating orthokeratology as 'night lenses' has a number of advantages.

"We can correct your myopia with specs, day lenses or night lenses..."

This communicates 3 options that are similarly effective and accessible to your patient. One option does not sound more complicated.

Using 'day lenses' groups the simplifies the various CL options you may offer AND helps patients understand that 'night lenses' will only be worn at night.



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'Night Lenses'

Night lenses is a term that patients can say...

"Do I have to wear the night lenses every night?"

Reducing barriers to communication between your patient and you.

AND...

"I have started wearing night lenses, they are amazing!"

Enabling them to communicate an uncomplicated term with their friends.



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College of Optometry Guidance

2. What to tell patients and parents

- Practitioners should be able to explain to parents what myopia is and what lifestyle factors may impact myopia, the increased risks to long-term ocular health that myopia brings, and the approaches that can be used to manage myopia.^{1, 2} This includes conventional refractive correction and available treatment options intended to slow its progression.

3. Managing risks associated with myopia management

Myopia management contact lenses and Orthokeratology^{1, 7, 12, 13}

Myopia management spectacles^{6, 7}



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'Orthokeratology' to Patients

Every contact lens that has ever been fitted moulds the outer layer of the eye that is a layers of cells like the skin that shed (corneal epithelium).

Night lenses use the process called orthokeratology to control this moulding accurately. Temporarily reshaping the cornea to correct vision. It is the gentle suction forces under the lens that cause the epithelial cell to change.

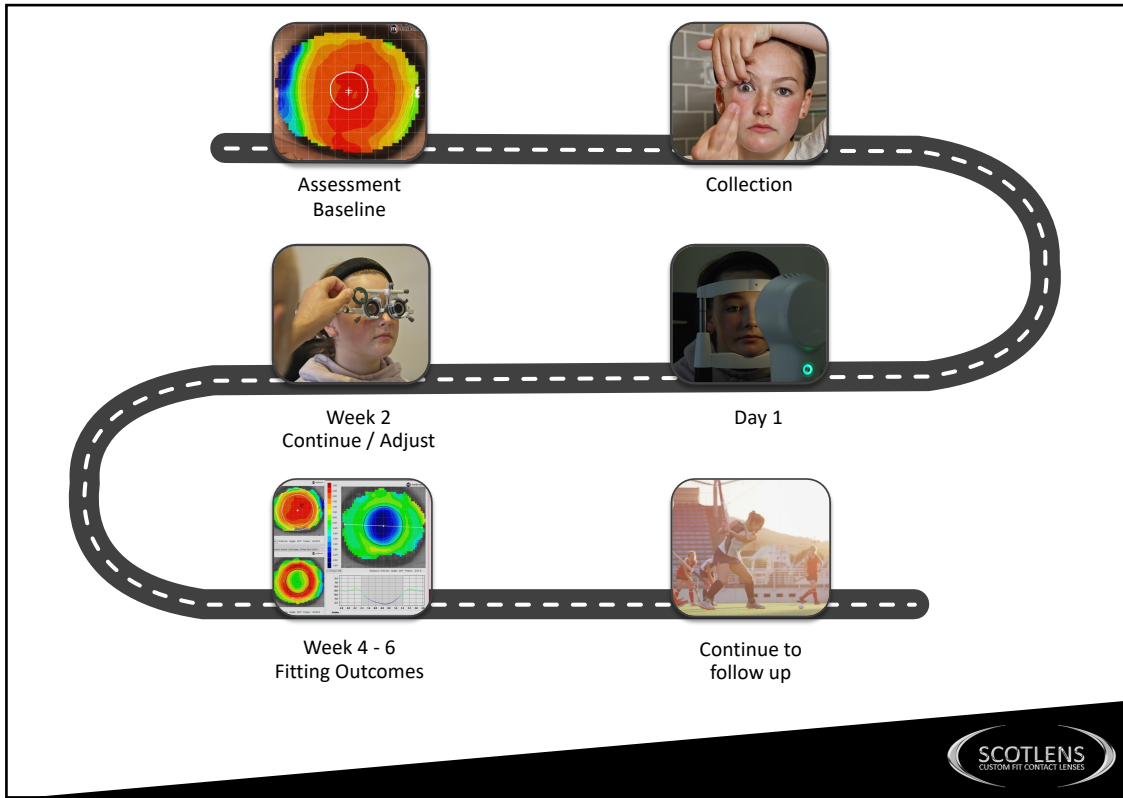
When worn nightly the epithelium changes are stable providing myopic correction throughout the patient's waking hours.

This process is completely reversible, with the cornea returning to its original shape upon discontinuation.

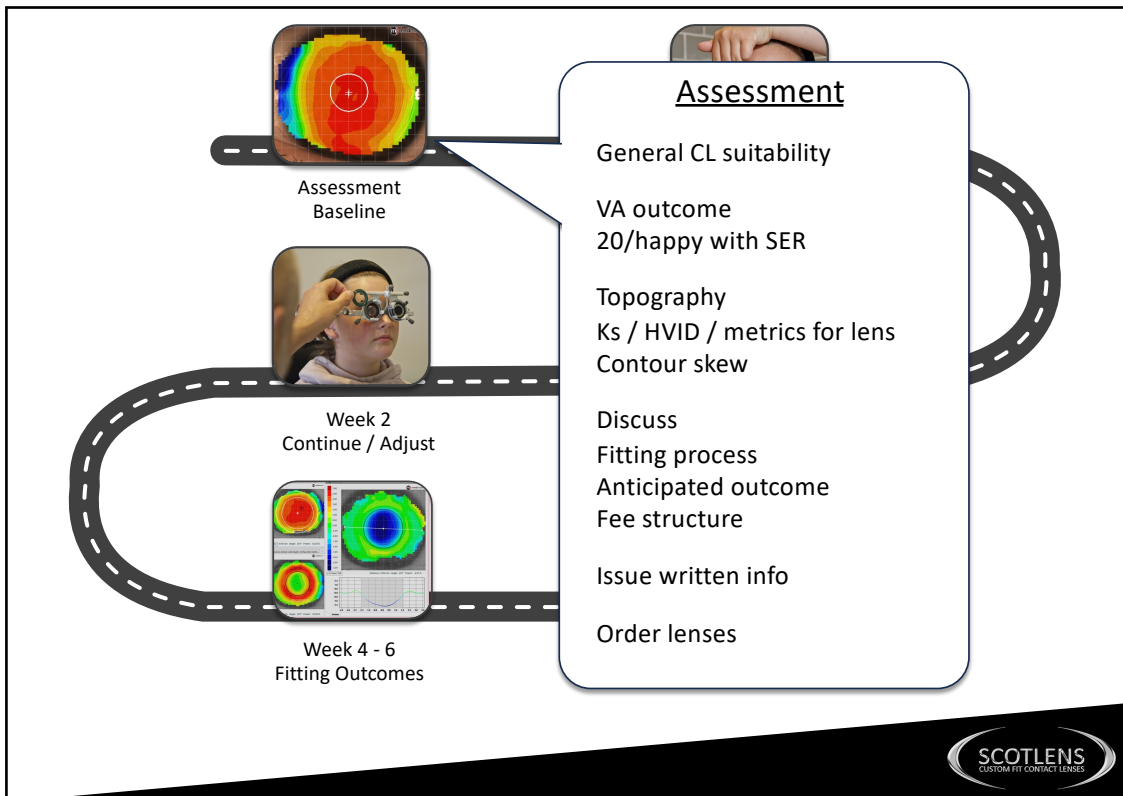
It is generally successful for myopes up to -5.00 dioptres in eyes with astigmatism up to -1.50 dioptres.



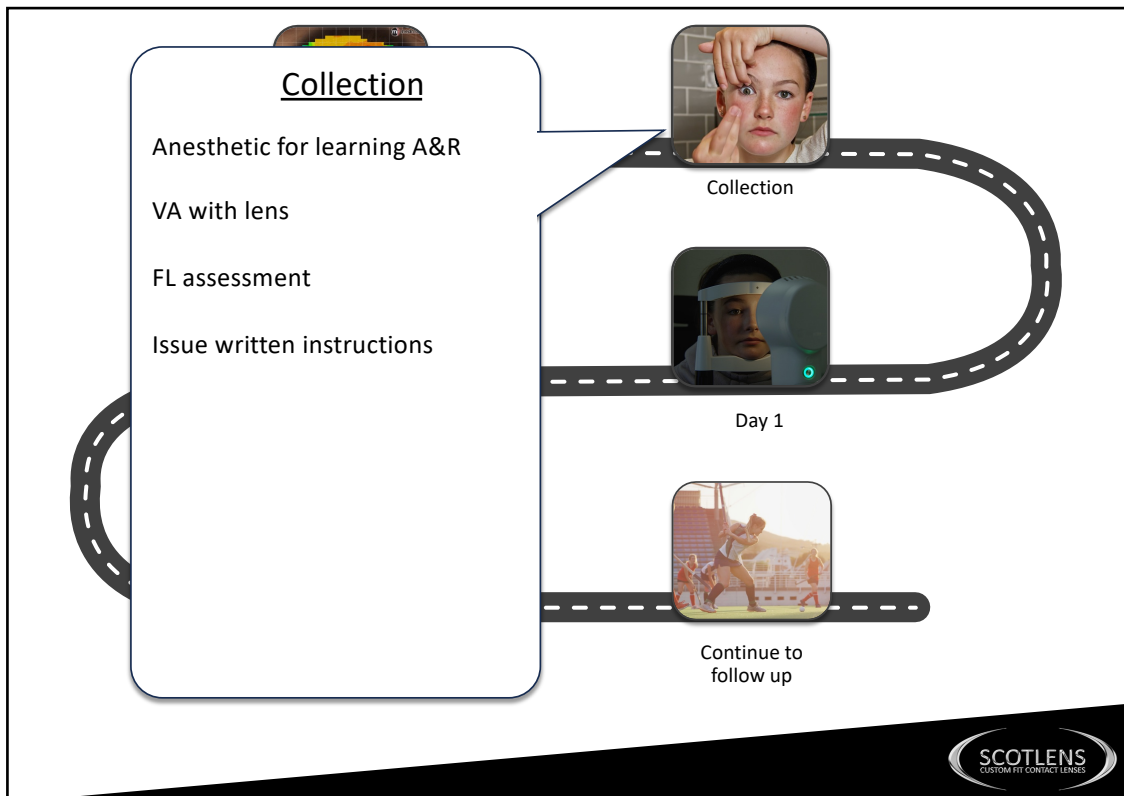
43



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45



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Vision over 1st few days

Bear in mind most myopes don't notice -1.00D

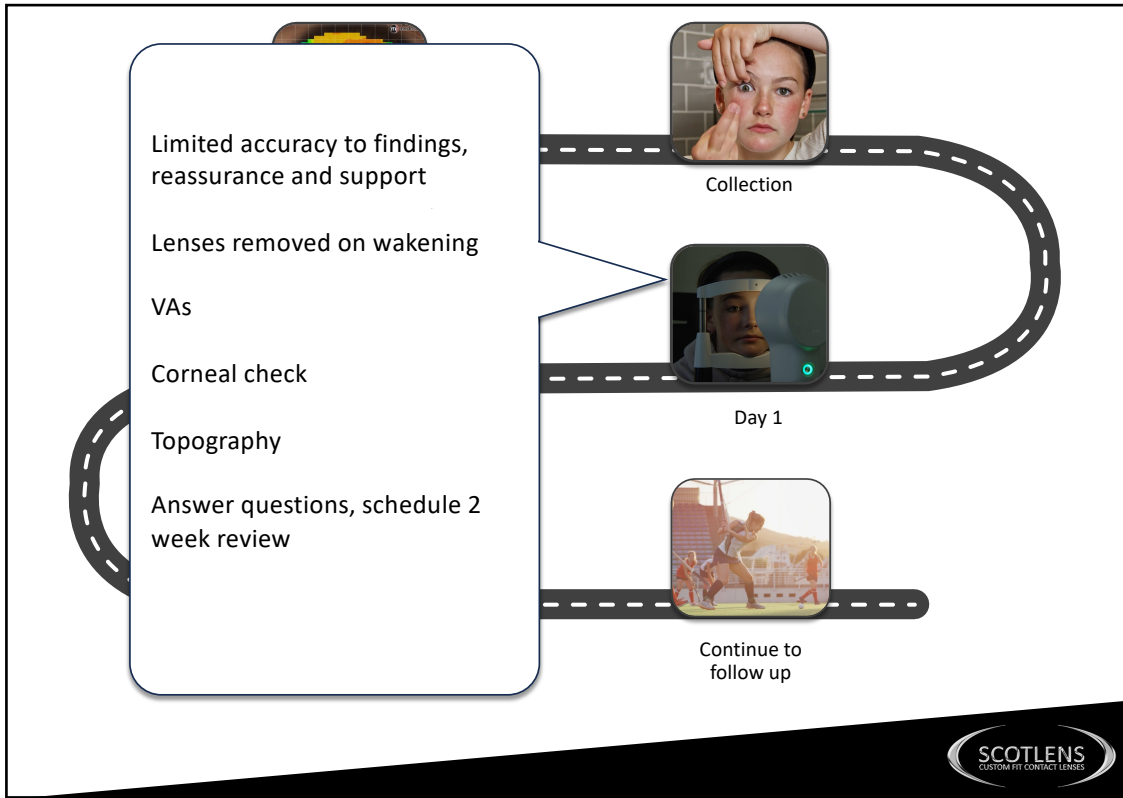
- Day 1 Waking pretty good. Fades by lunch, specs prn
- Day 2 Waking pretty good. Fades by pm, specs prn
- Day 3 Waking pretty good. Fades by pm, specs prn
- Day 4 Waking pretty good. Fades by pm specs prn

Collect any time during the week. On night 1 best.

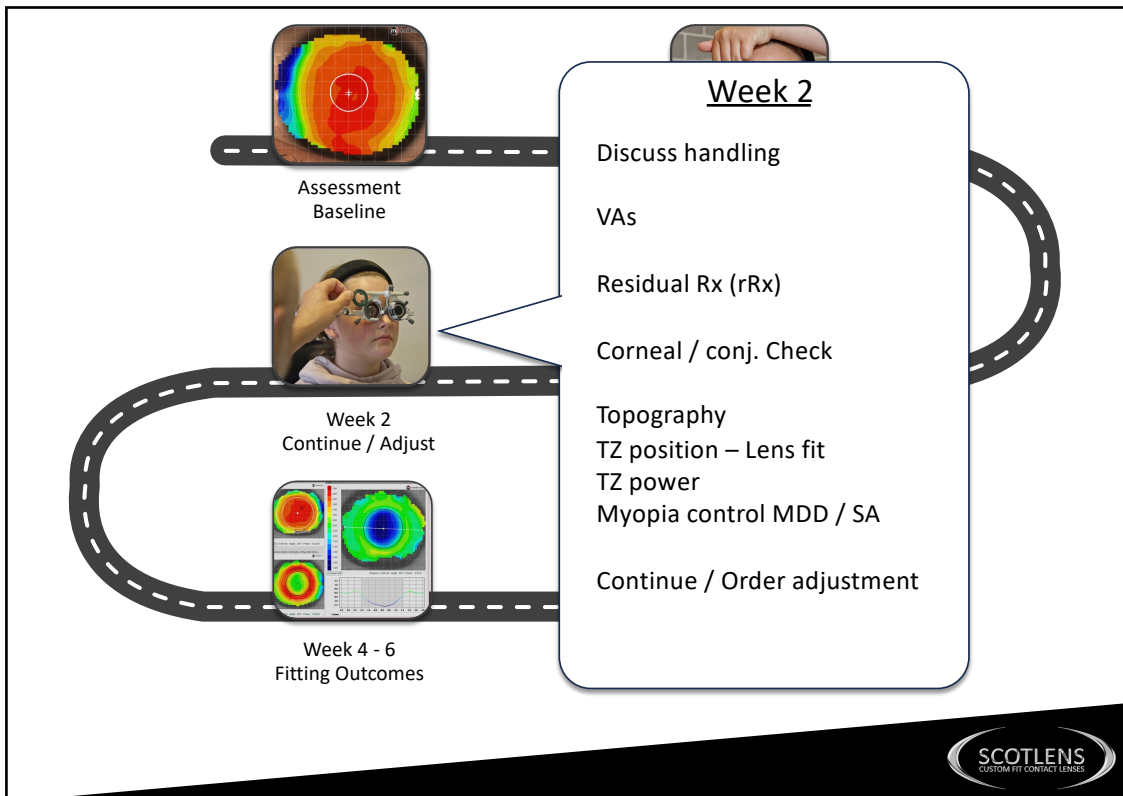
Wear Friday, Saturday, Sunday before work on Monday

NO day lenses, as massage epithelium and undo effect

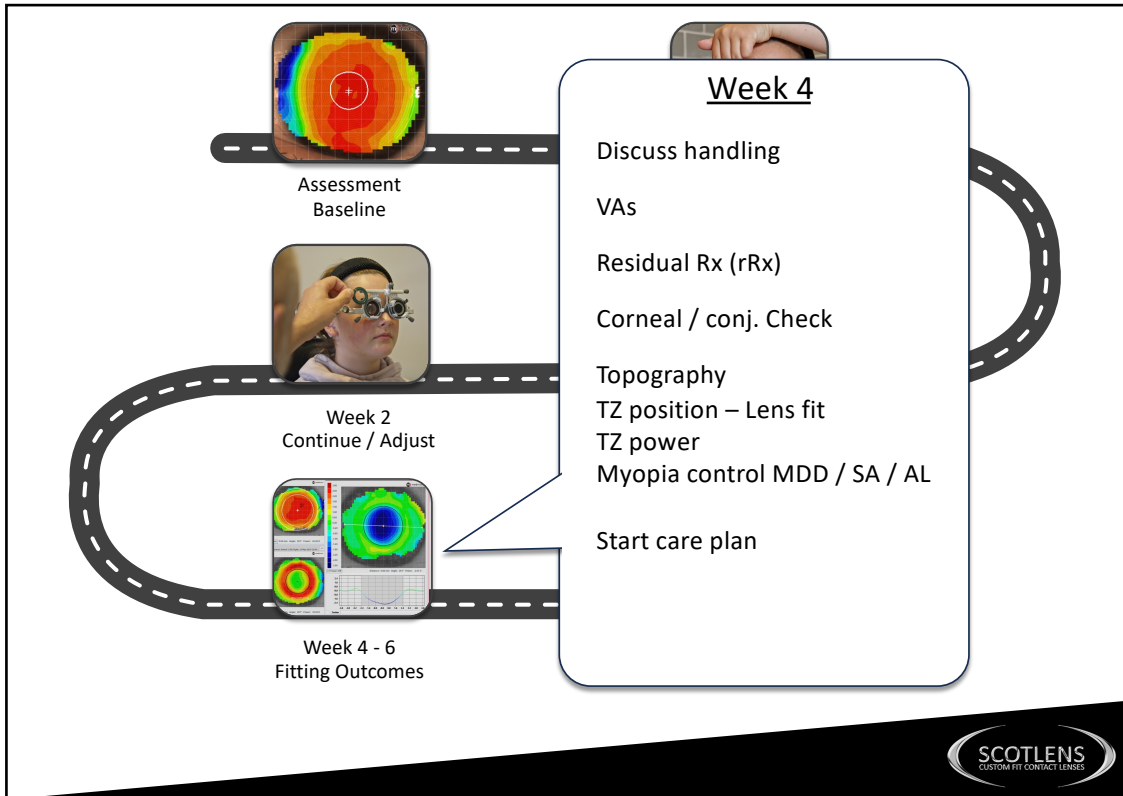
48



53



54



55

NIGHT LENSES

NON-SURGICAL PERFECT SIGHT

the #1 eyecare option for short-sighted elite sportspeople

The 4 mainstream eyecare options:

Glasses Day lenses Night lenses Laser surgery

Short-sighted elite sportspeople lose performance and risk race or match catastrophies when they use prescription sports glasses / goggles or day lenses.

"Night lenses are an alternative to laser eye surgery. Perfect sight with nothing in your eye. Why compete with a contact lens in your eye if you don't have to?"

CLICK IMAGES TO READ MORE

NIGHTLENSES.COM
CONNECT tom@nightlenses.com

NO SPORTS PEOPLE ARE PAID TO PROMOTE NIGHT LENSES
NIGHT LENSES CAN ONLY BE BOUGHT FROM OPTICIANS (NOT DIRECT ONLINE)
NIGHTLENSES.COM IS AN INDEPENDENT ADVICE SITE CONTAINING ALL UK FITTERS
CERTIFIED NIGHT LENS SPORTS SPECIALIST OPTICIANS ARE AVAILABLE

"I've seen players dealing with their lenses during the game. That's the last thing you want to be worrying about."

Jacob Lineen
Rugby player

"I don't even consider myself to have any kind of sight problem now."

Catriona Morrison
World Champion
Dusthorn

"Night lenses give me one less responsibility during match day to think about."

Jason Brown
Footballer

"Having nothing in my eye to worry about on match day was literally a game changer for me."

Chris Fusaro
Rugby player

"I have 52 seconds to prove a point. The last thing I want to panic about are my lenses."

Chris Walker-Hebborn
Olympic & Commonwealth medalist, Backstroke

"I'd get anxious thinking my lens was going to fall out and not concentrate on the game."

Diego Esquivel McGann
Footballer

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CUSTOM FIT CONTACT LENSES

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NIGHT LENSES

NON-SURGICAL PERFECT SIGHT

the #1 eyecare option for

The 4 mainstream

Glasses **Day lenses**

Short-sighted elite sportspeople led catastrophes when they use pres

"Night lenses are an alternative to in your eye. Why compete with a

CLICK IMAGES TO REA

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68%
Patients prefer OK night lenses to soft day lenses

Overnight Corneal Reshaping versus Soft Disposable Contact Lenses: Vision-Related Quality-of-Life Differences From a Randomized Clinical Trial
LIPSON, MICHAEL J. DO, FRCO, SUGAR, ALAN MD, MS, MUSCH, DAVID C. PhD, MPH
Author Information ©
Optometry and Vision Science 82(10) p 886-891, October 2005. | DOI: 10.1097/OV.000018018.40127.d

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CUSTOM FIT CONTACT LENSES

Testimonials from athletes:

- Jacob Lineen (Rugby player): "I've seen players dealing with their lenses during the game. That's the last thing you want to be worrying about."
- Catriona Morrison (World Champion Duathlete): "I don't even consider myself to have any kind of sight problem now."
- Chris Fusaro (Rugby player): "Having nothing in my eyes to worry about on match day was literally a game changer for me."
- Diego Esquivel McGann (Footballer): "I'd get anxious thinking my lens was going to fall out and not concentrate on the game."

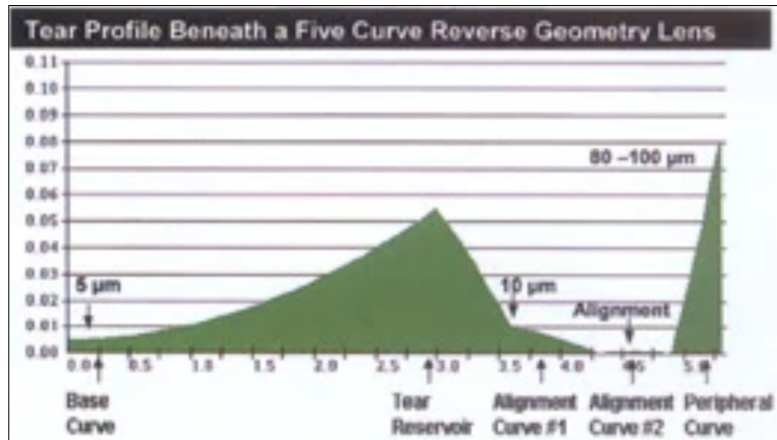
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LENS DESIGN



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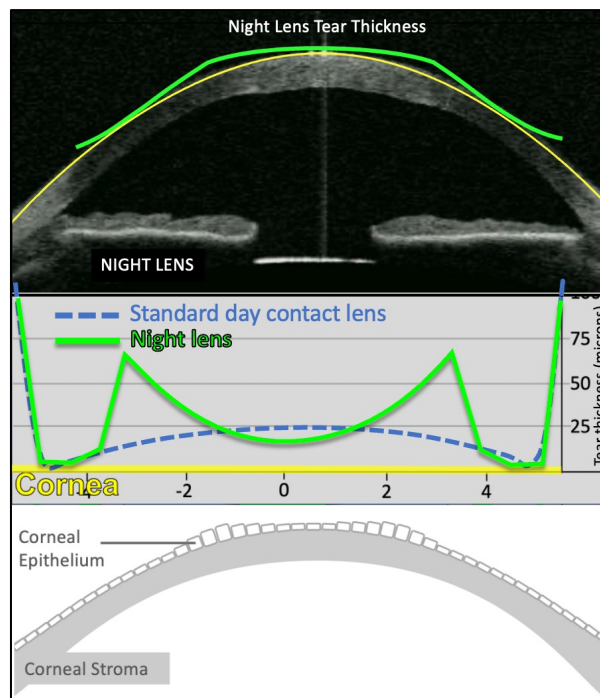
Corneal Topography and Orthokeratology: Pre-fitting Evaluation

Corneal topography accurately analyzes the pre-fitting cornea of an orthokeratology patient.

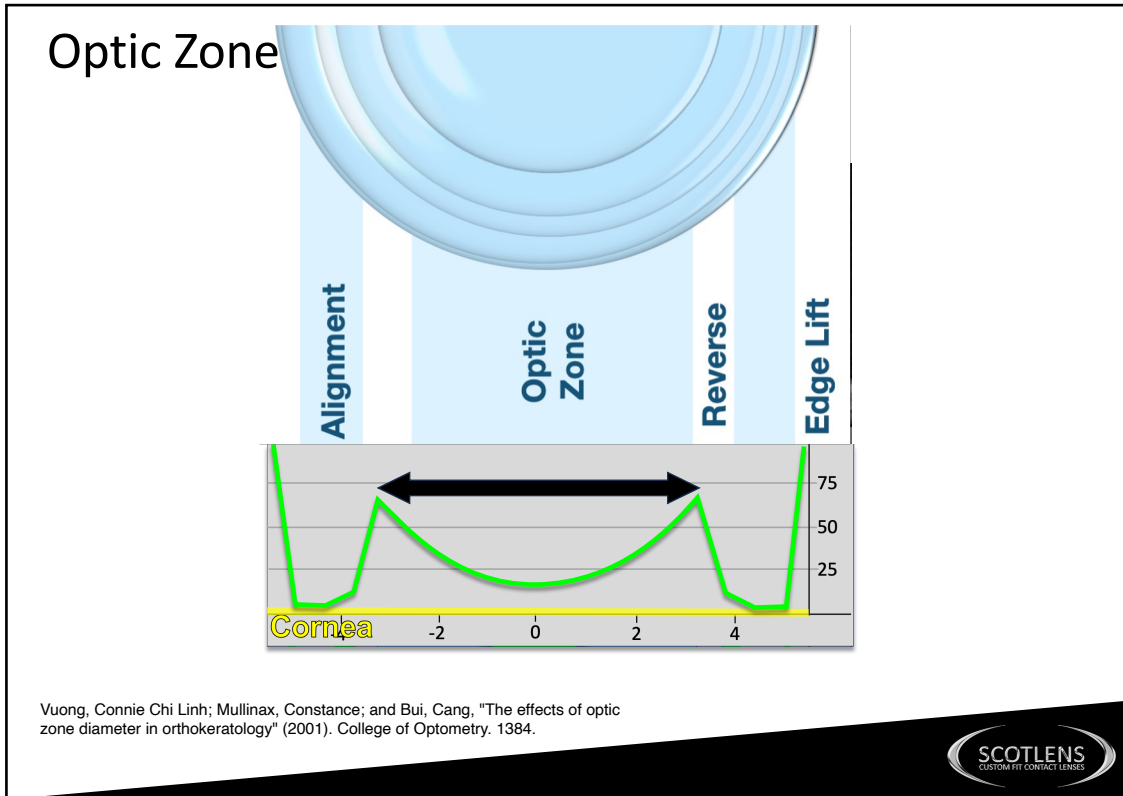
By John Mountford, Dip. App. Sc, FAAO, FCLSA, Patrick J. Caroline, FCLSA, FAAO, and Don Noack, Dip Opt (WA)



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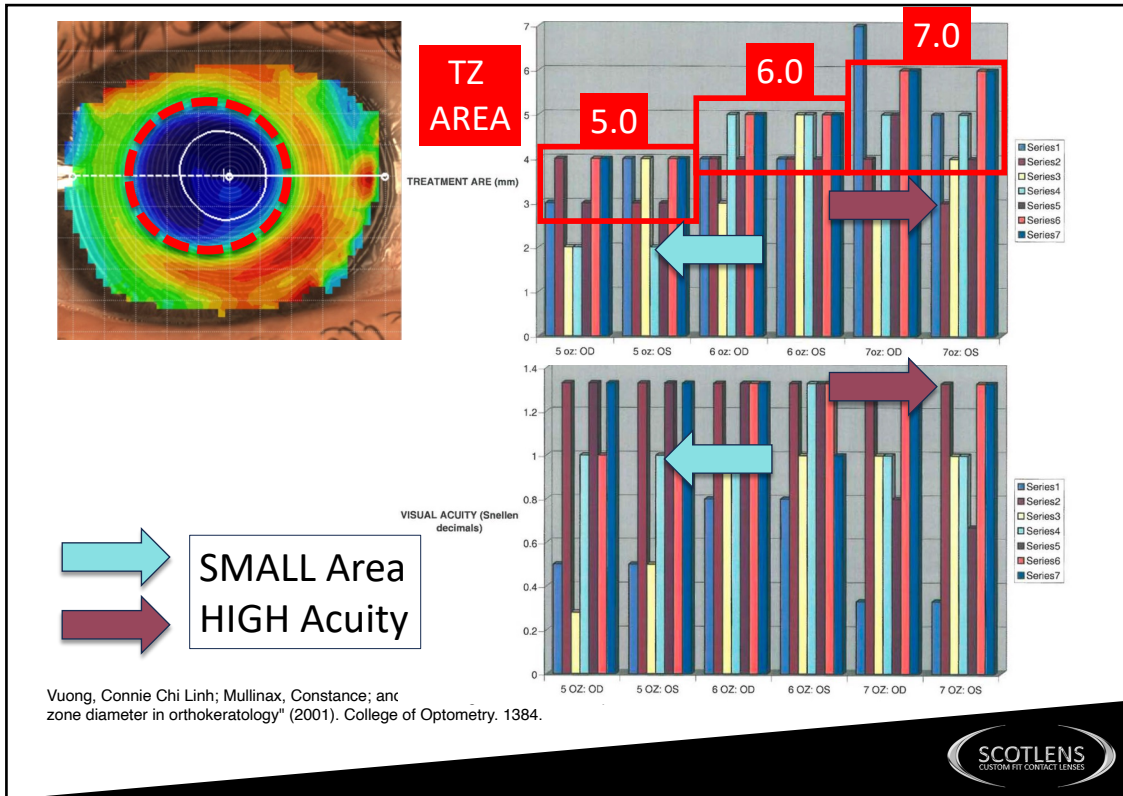
Optic Zone (OZ)

**MAXIMUM ACUITY ACHIEVED
(SNELLEN FRACTION)**

SUBJECT NUMBER	5.0 OD	5.0 OS	6.0 OD	6.0 OS	7.0 OD	7.0 OS
1	6/12	6/12	6/7.5	6/7.5	6/18	6/18
2	6/5	6/5	6/5	6/5	6/5	6/5
3	6/21	6/15	6/6	6/6	6/6	6/6
4	6/6	6/6	6/6	6/5	6/6	6/6
5	6/5	6/5	6/5	6/5	6/7.5	6/9
6	6/6	6/6	6/5	6/5	6/5	6/5
7	6/5	6/5	6/5	6/6	6/5	6/5

Vuong, Connie Chi Linh; Mullinax, Constance; and Bui, Cang, "The effects of optic zone diameter in orthokeratology" (2001). College of Optometry. 1384.

72



76

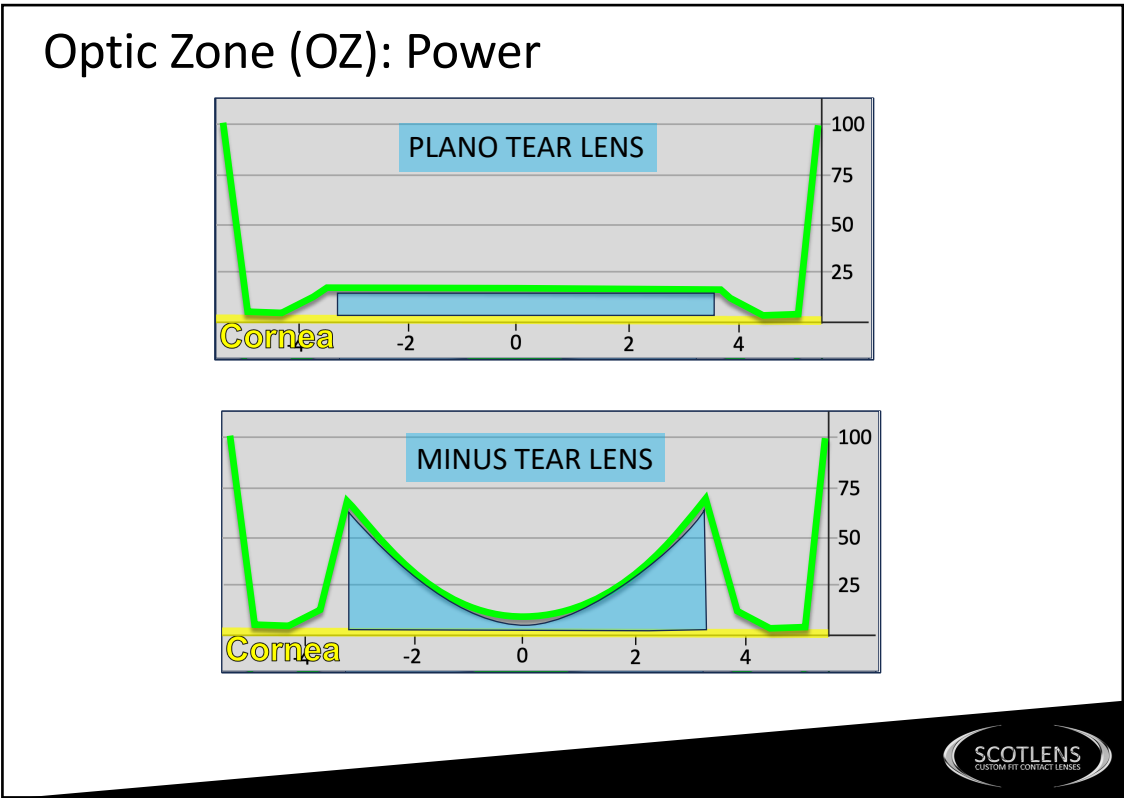
FACTS - Optic Zone (BOZD)

- Reducing BOZD can reduce TZ size
- TZ area does not guarantee VA
- Px prefer larger BOZD
- Higher Rx less predictable outcome
- Success with large BOZD 100%
- Success with 5.0 BOZD 70%

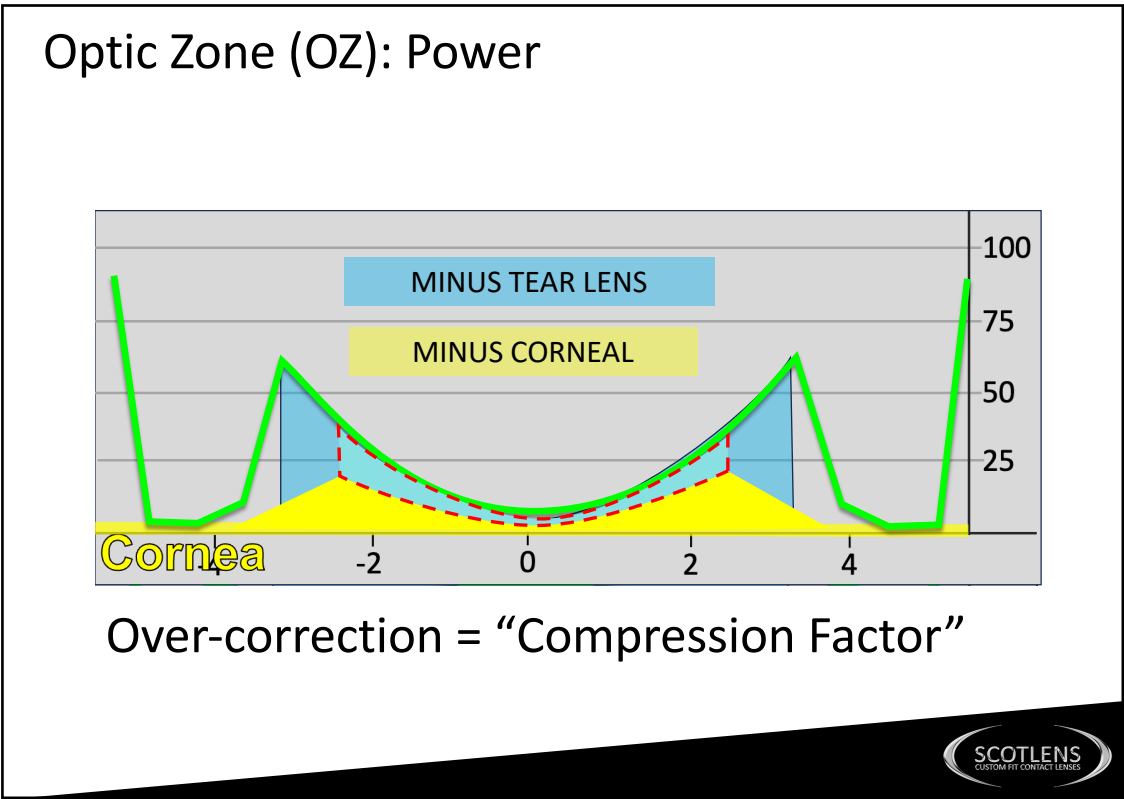
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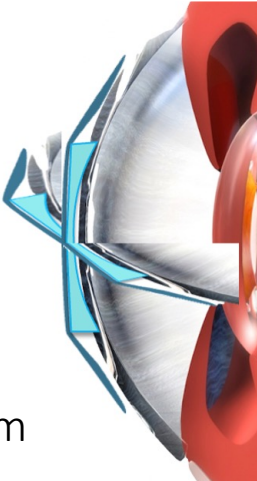

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Optic Zone (OZ): Power

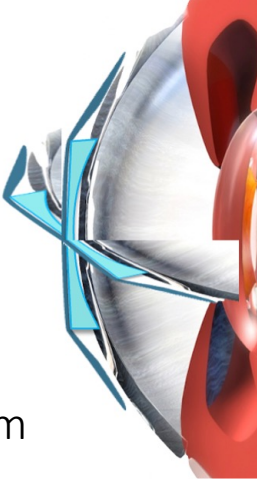

	@180		@90
K 7.85mm	= 43D	7.85mm	= 43D
Rx	= -1D		= -1D
Compression	= -1D		
Tear Lens	= -2D		= -2D
BOZR (D)	= 41D		= 41D
BOZR (mm)	= 8.25mm		= 8.25mm

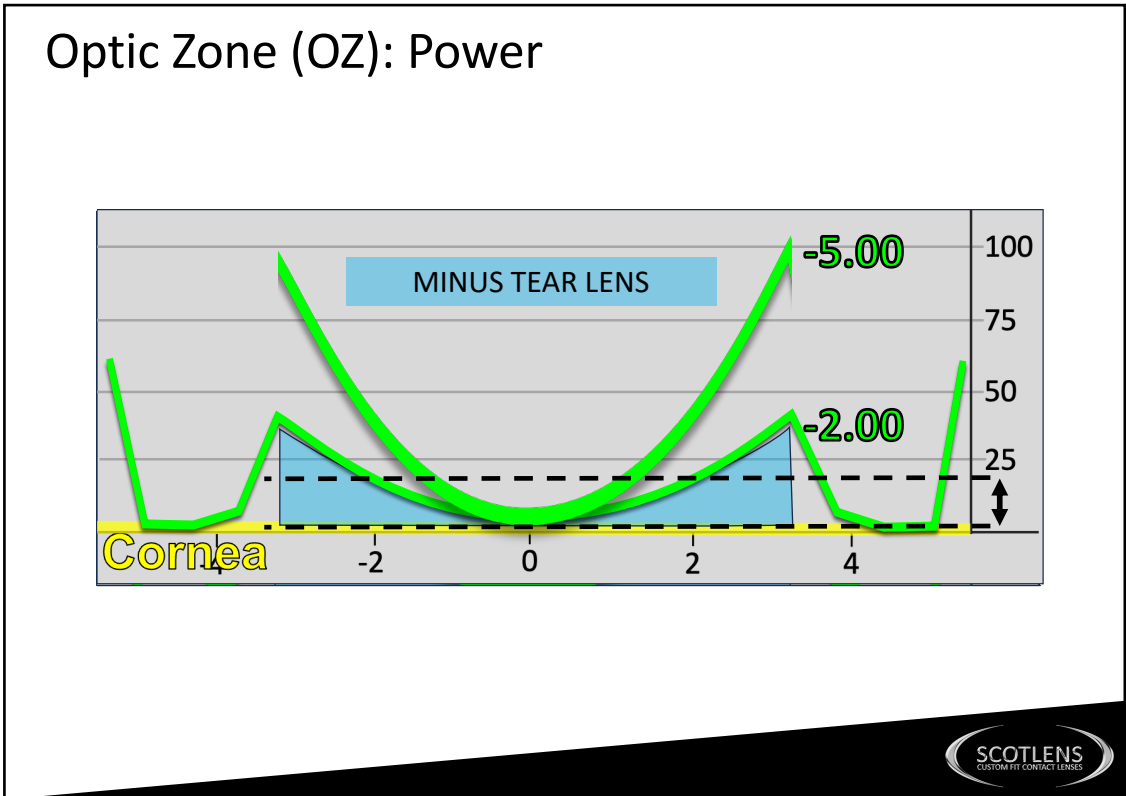
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Optic Zone (OZ): Power

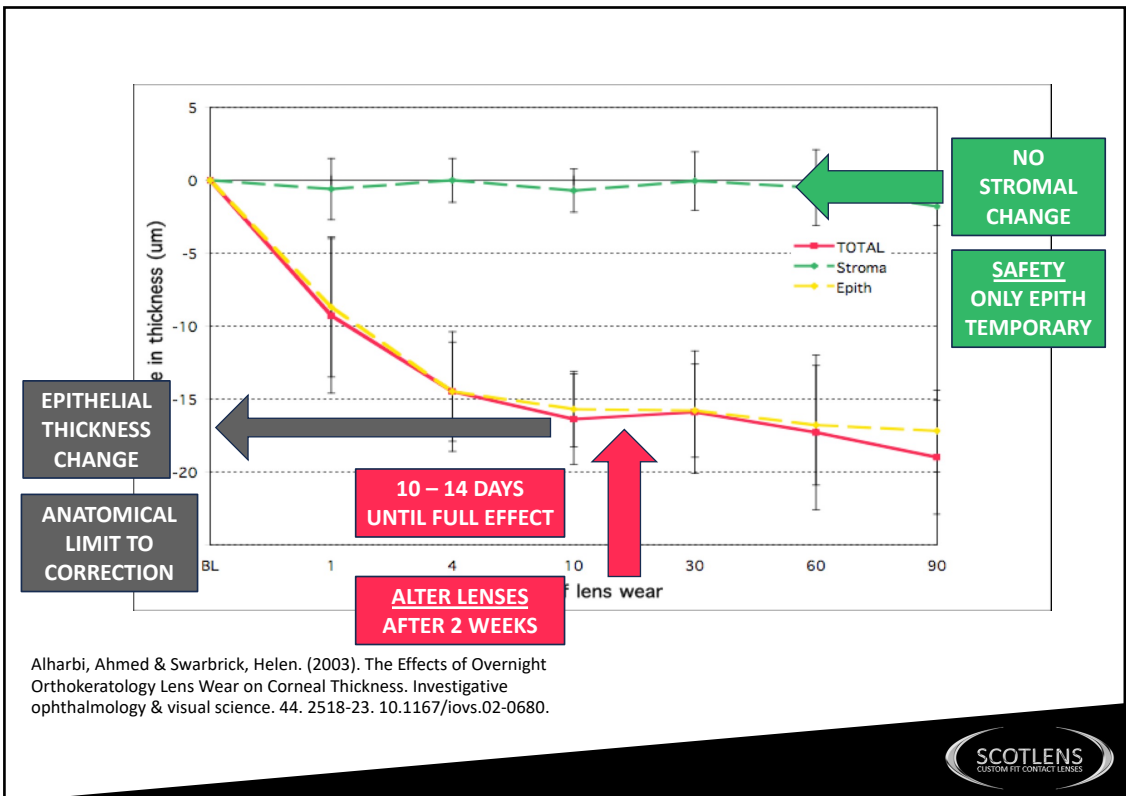
	@180		@90
K 7.85mm	= 43D	<u>7.65mm</u>	<u>= 44D</u>
Rx	= -1D		<u>= -2D</u>
Compression	= -1D		
Tear Lens	<u>= -2D</u>		<u>= -3D</u>
BOZR (D)	= 41D		= 41D
BOZR (mm)	= 8.25mm		= 8.25mm

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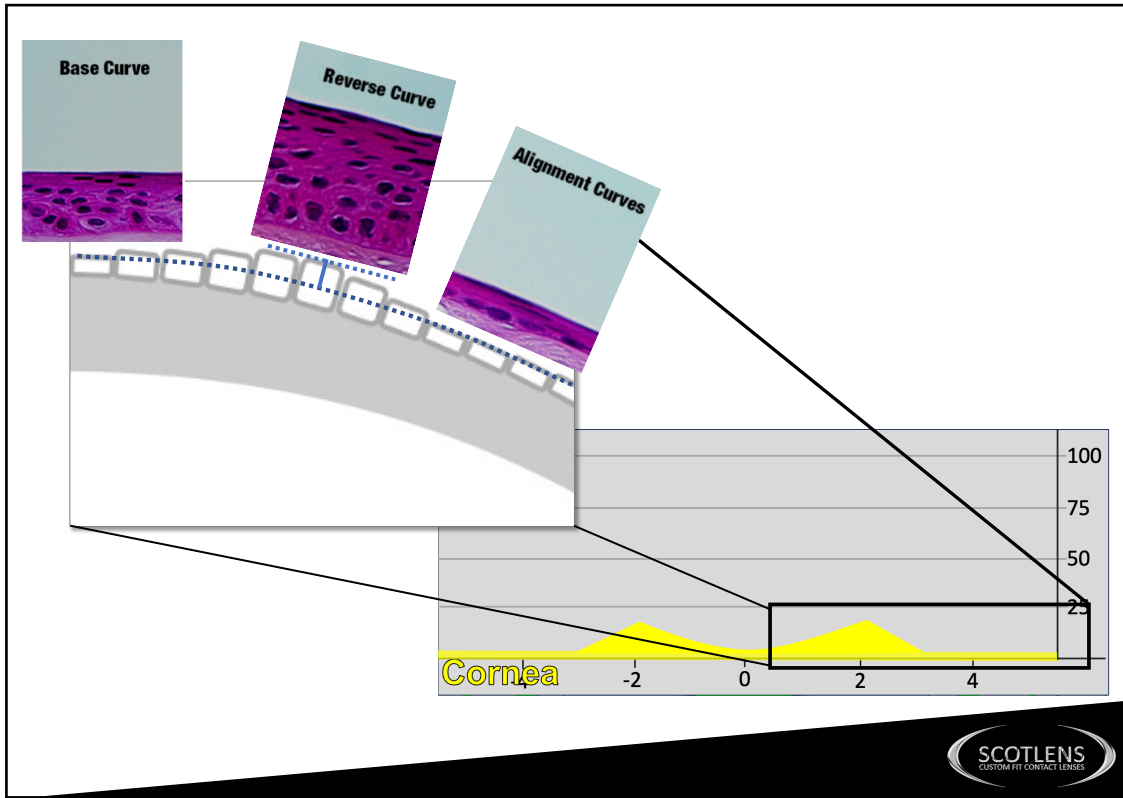


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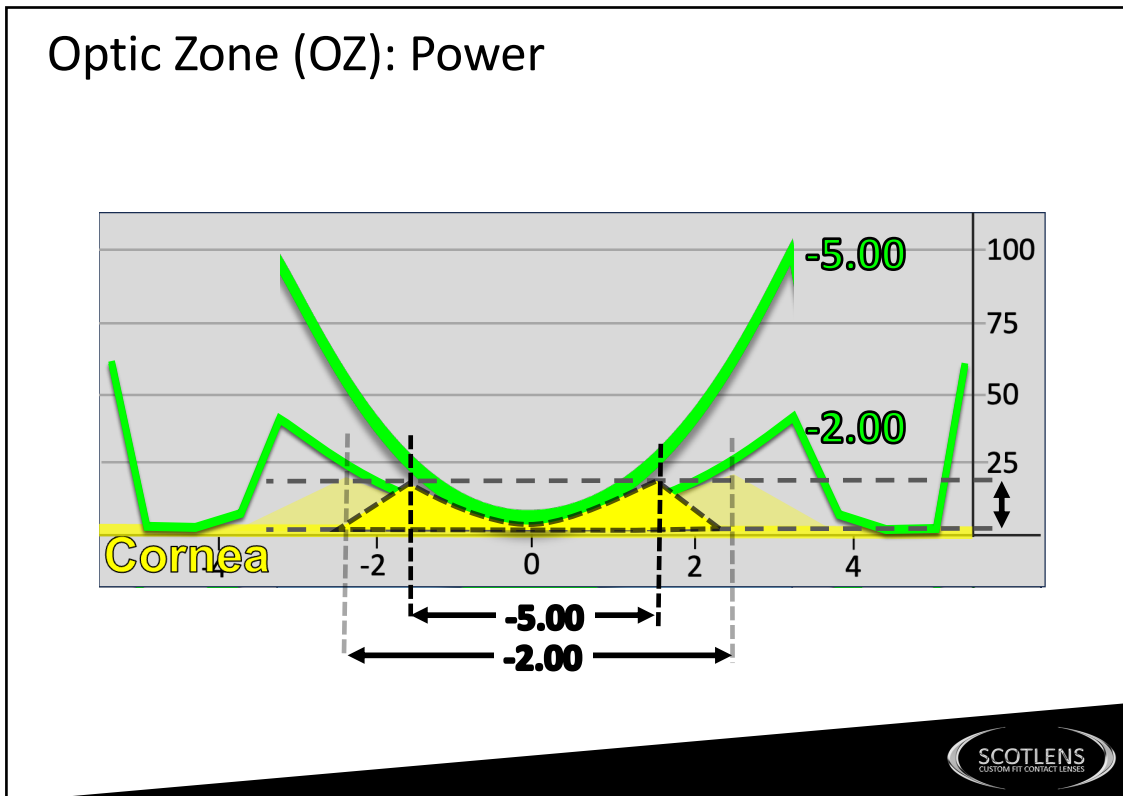


Alharbi, Ahmed & Swarbrick, Helen. (2003). The Effects of Overnight Orthokeratology Lens Wear on Corneal Thickness. Investigative ophthalmology & visual science. 44. 2518-23. 10.1167/iovs.02-0680.

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96



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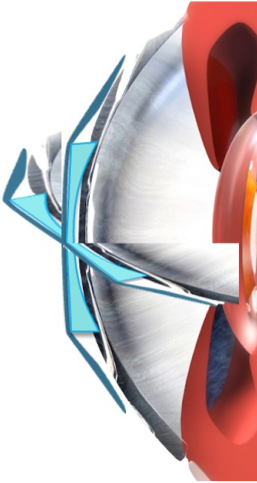

Optic Zone (OZ): Power

	@180		@90
K 7.85mm	= 43D	7.65mm	= 44D
Rx	= -1D		= -2D
Tear Lens	= -2D		= -3D

TEAR LENS SUGGESTS FULL CYL CORRECTION

Epith change	= 20um		=20um
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EPITHELIAL SUGGESTS NO CYL CORRECTION





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Rx Correction Range

20/HAPPY – Expect some residual Rx

Right:	6/6	N6	-0.25 / -0.75 x 5	VA: 6/5	N6-
Left:	6/12+/-	N5	Plano / -1.50 x 70	VA: 6/5-1	N6-



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Rx Correction Range

20/HAPPY – Expect some residual Rx

VA similar to spherical soft CL up to -5.00DS

TZ is like a distance centre multifocal with an ADD the same as the target Rx.

Rx: -5.00 = Distance centre Add+5.00

Sphere twice cyl value e.g. -2.00/-1.00x180

Cyl correction unpredictable even with accurate topography



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Rx Correction Range

Average reduction in myopia (210 eyes)

Initial Myopia	Mean Reduction (D)	Mean Residual (D)
0 to -1.00	1.15	0.21
>-1.00 to -2.00	1.52	-0.15
>-2.00 to -3.00	2.39	-0.13
>-3.00 to -4.00	3.29	-0.22
>-4.00 to -5.00	3.85	-0.57
>-5.00 to -6.00	4.67	-0.68
>-6.00	4.88	-1.25

https://www.accessdata.fda.gov/cdrh_docs/pdf/p010062d.pdf



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Examples

15yo R&L -3.00/-0.50x180

Motive - 'hates specs', rugby

Result – BVS full correction expected

Expect – Over specs not expected

41yo R&L -3.50/-2.75x180

Motive – Iron man losing DD, work finance on PC 8-10hrs

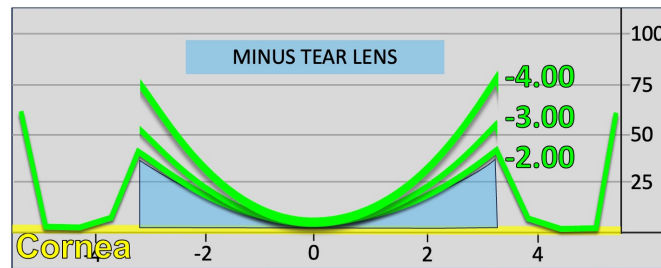
Result – SE as d/disp residual cyl expected

Expect – Vision acceptable for sport
Specs for full time for work
ORx: R&L Plano/-2.75 x 180



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Optic Zone (OZ):



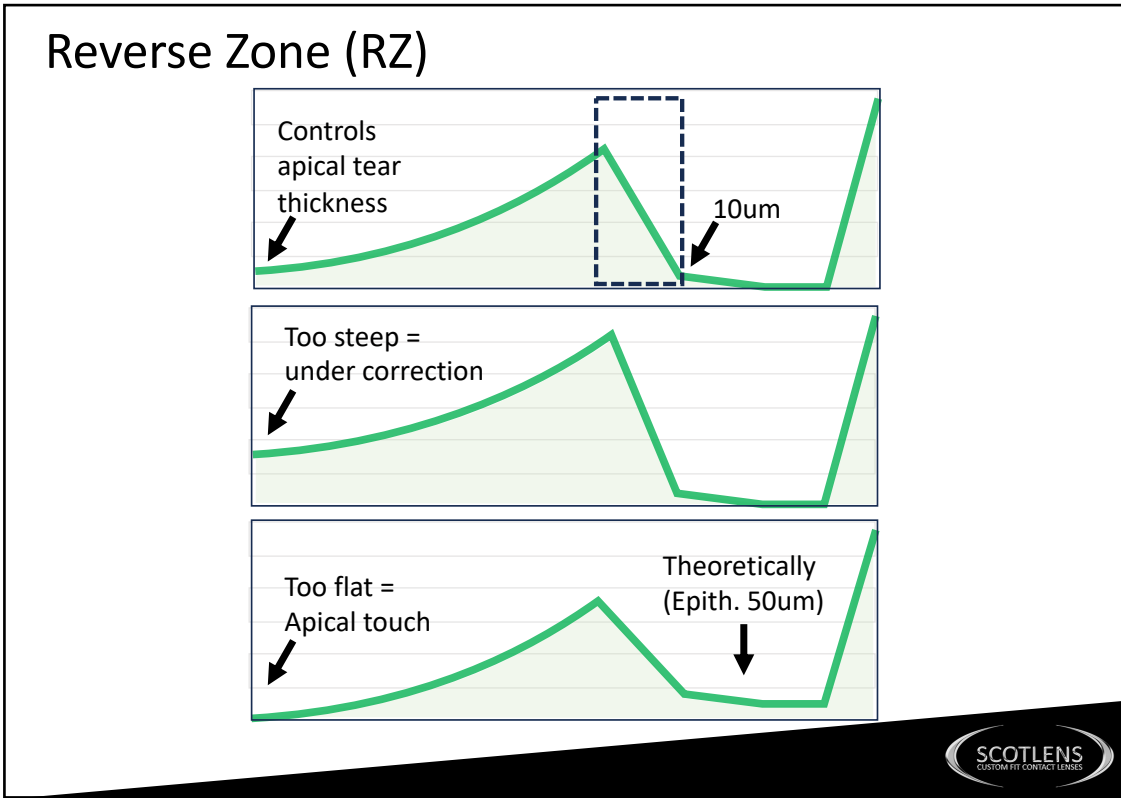
Summary

- OZ power - like any lens, need extra -0.50 change -0.50 (+0.1mm)
- Lens power more than target Rx (compression/Jessen)

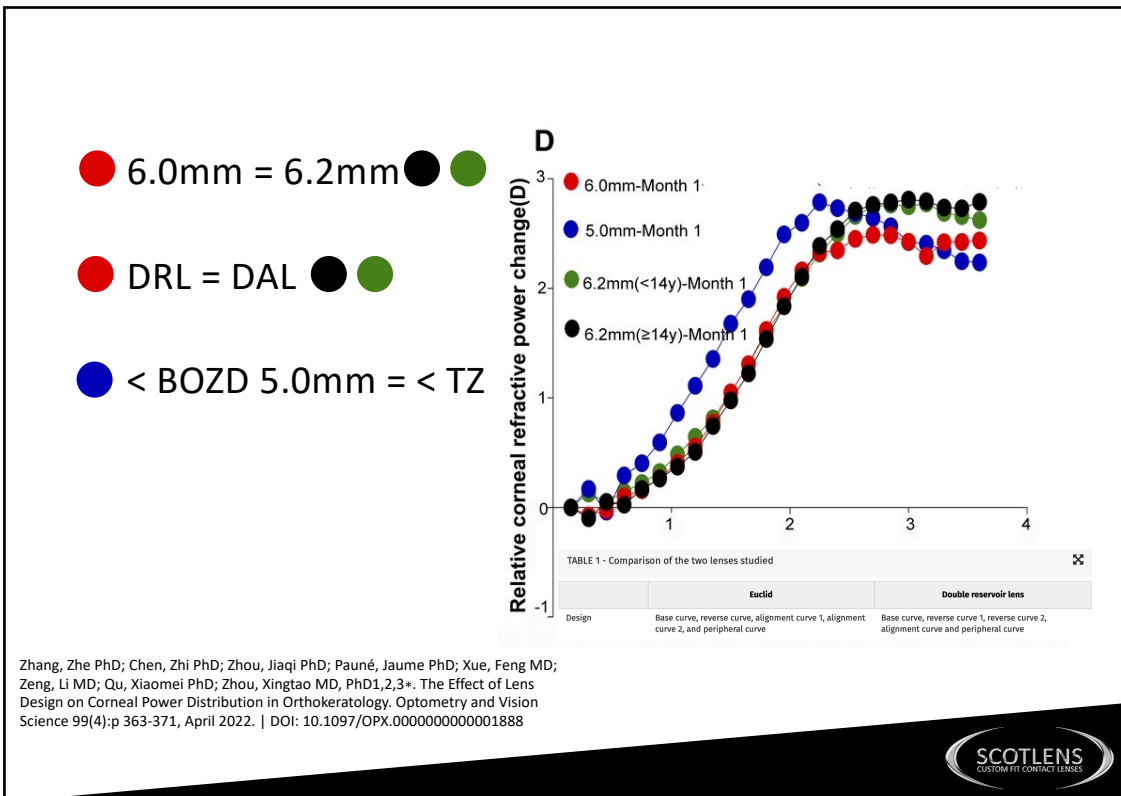
OZ Diameter – Px can be sensitive to smaller diameters, especially as Rx↑



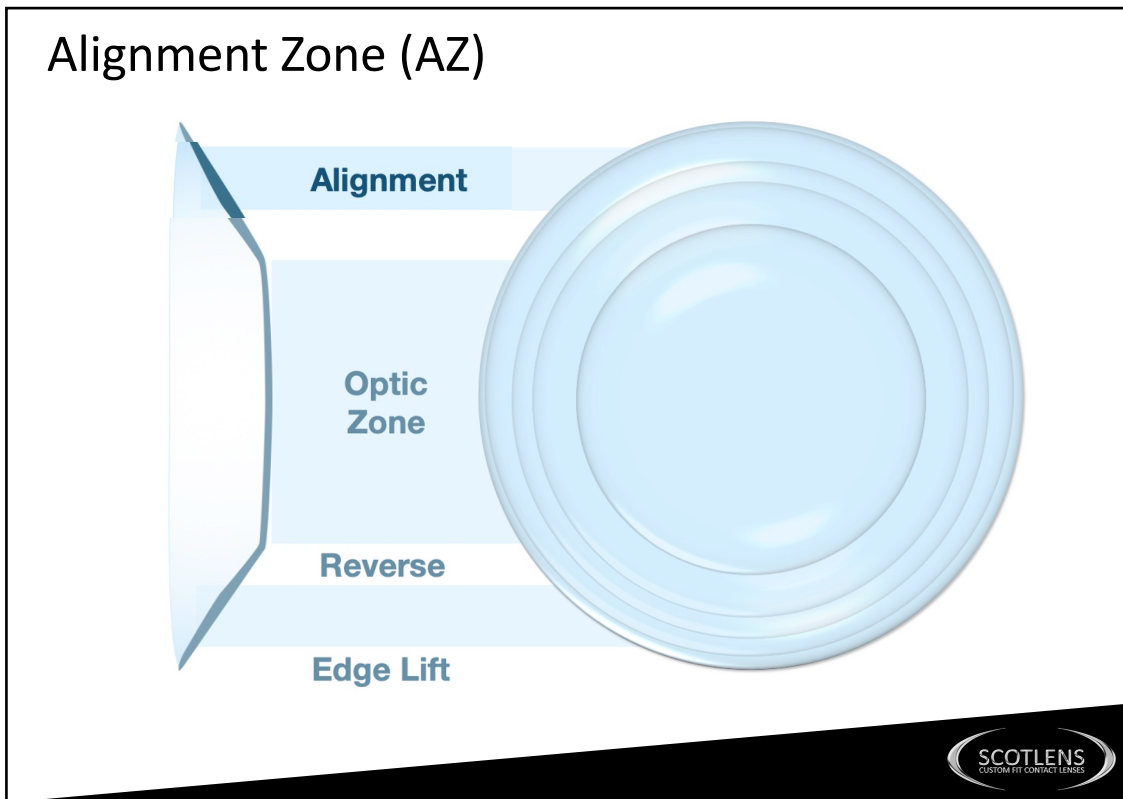
107



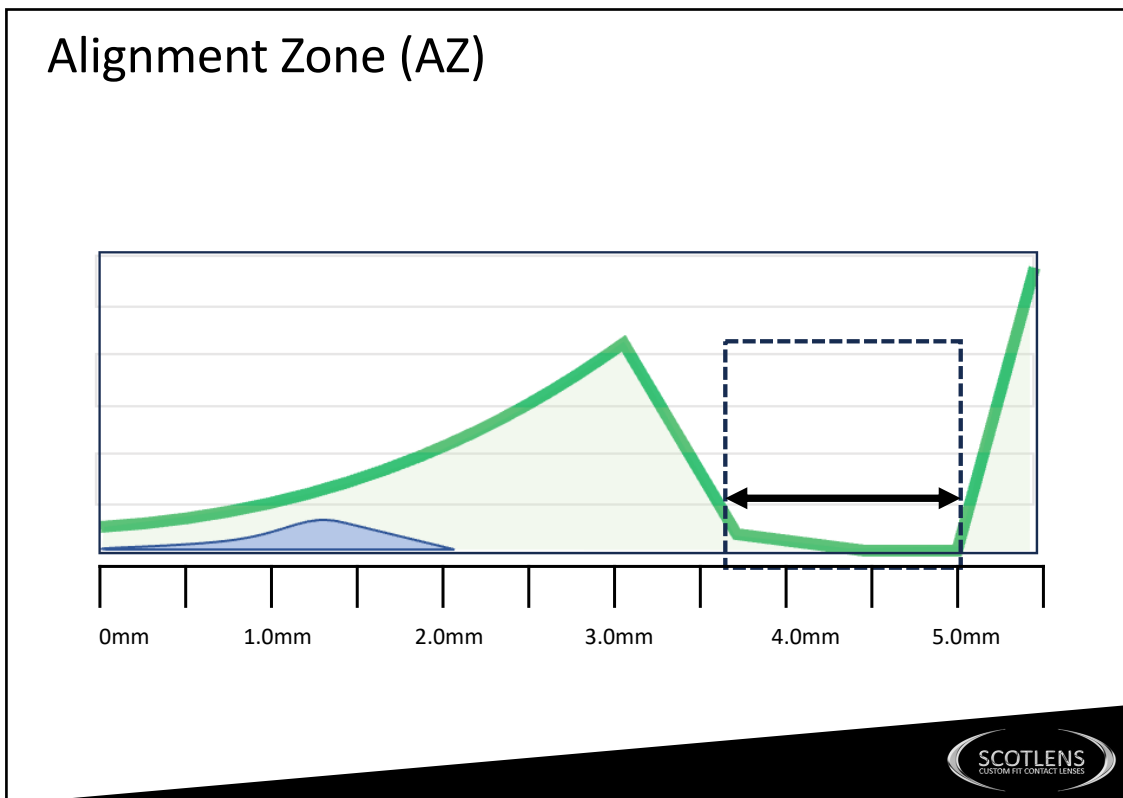
111



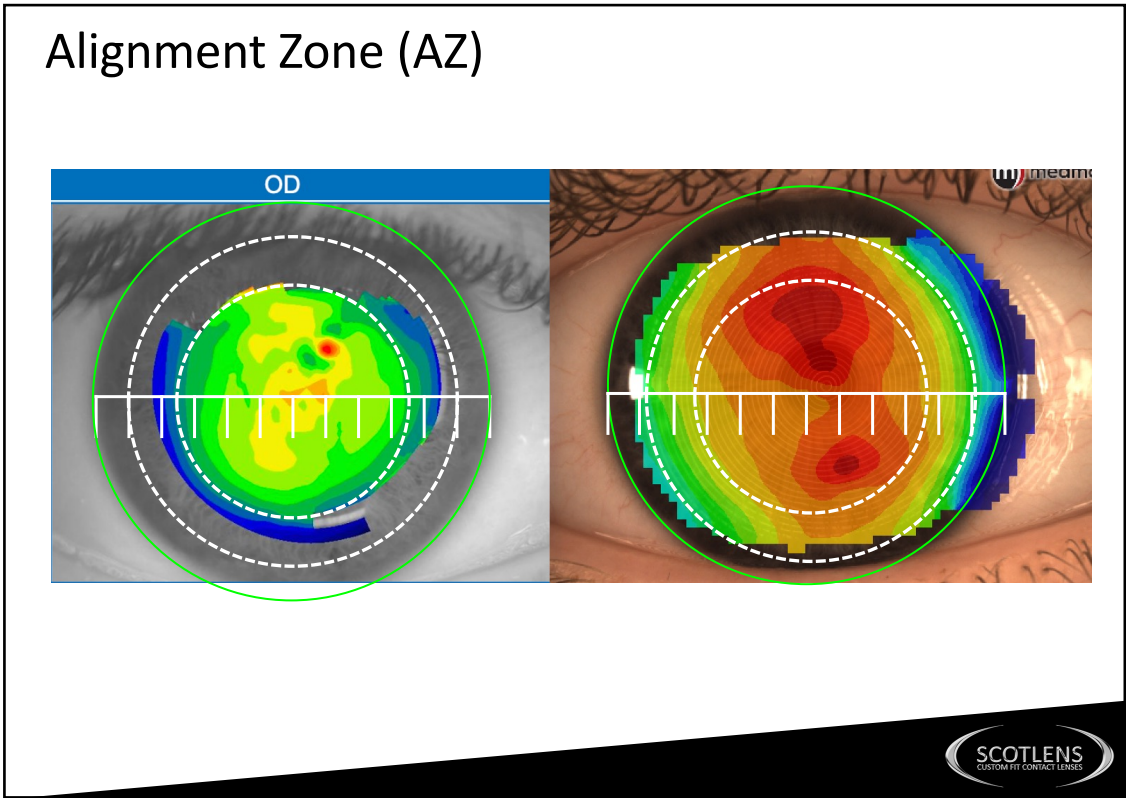
114



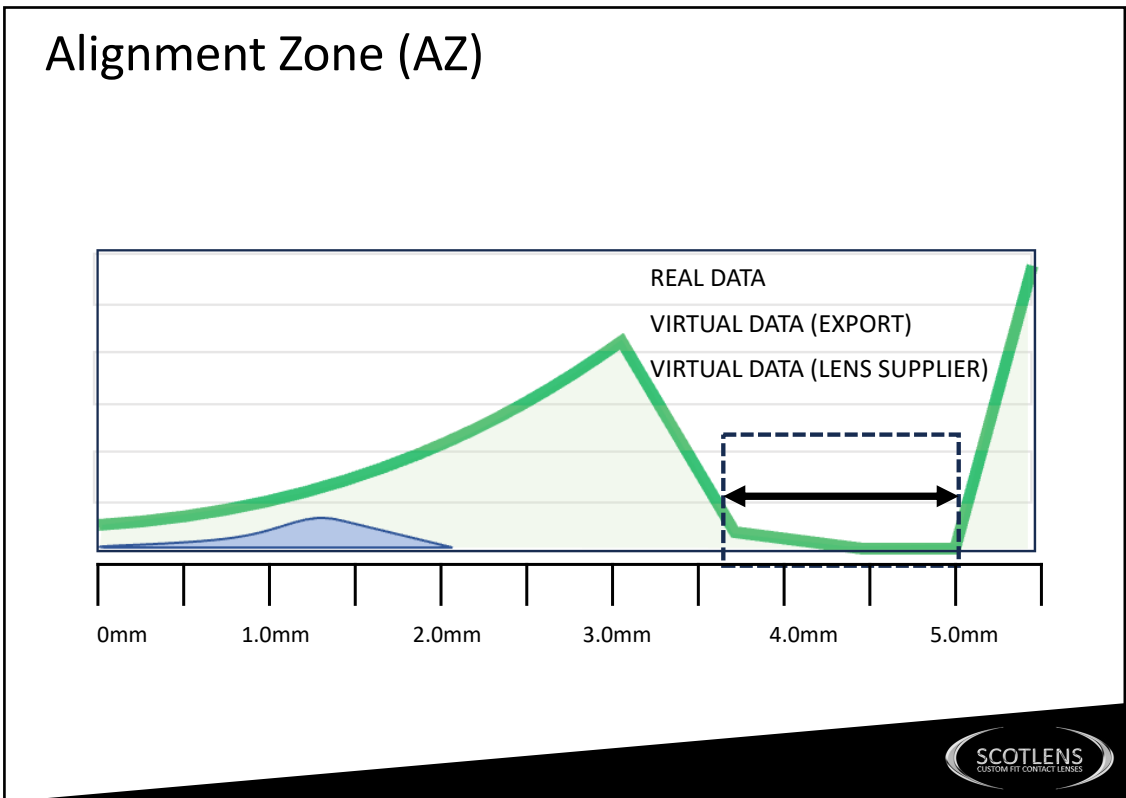
116



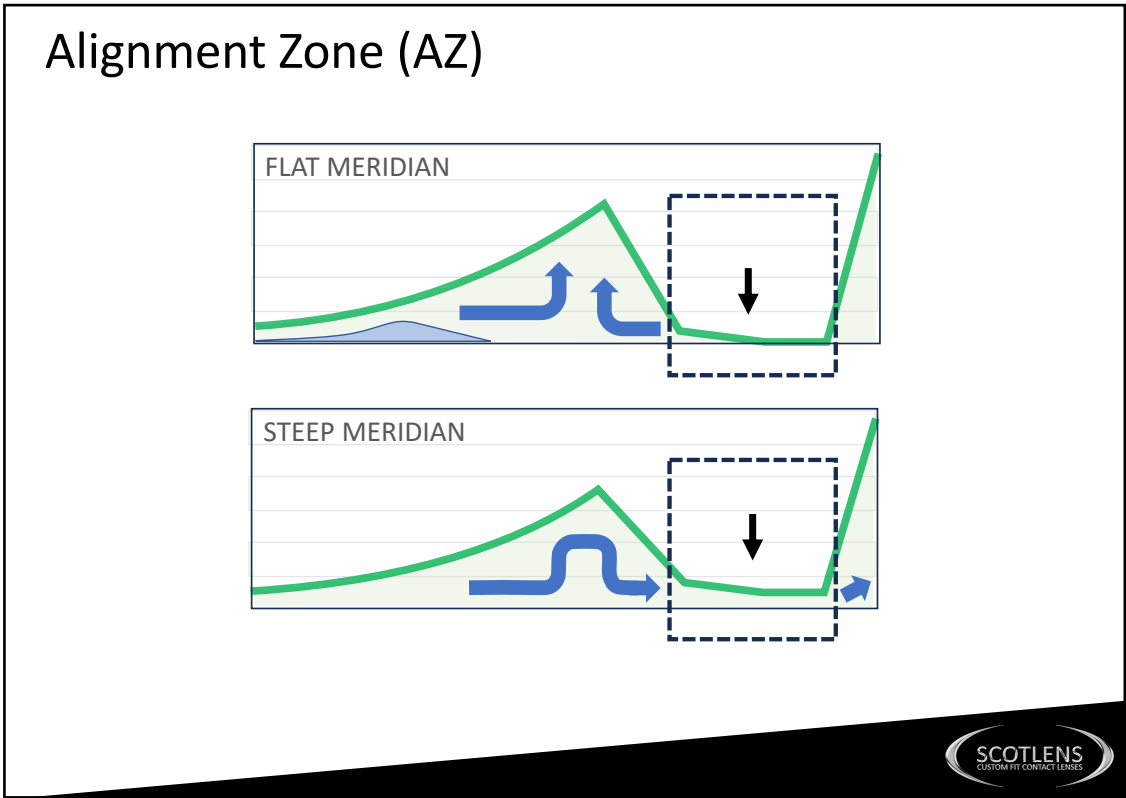
120



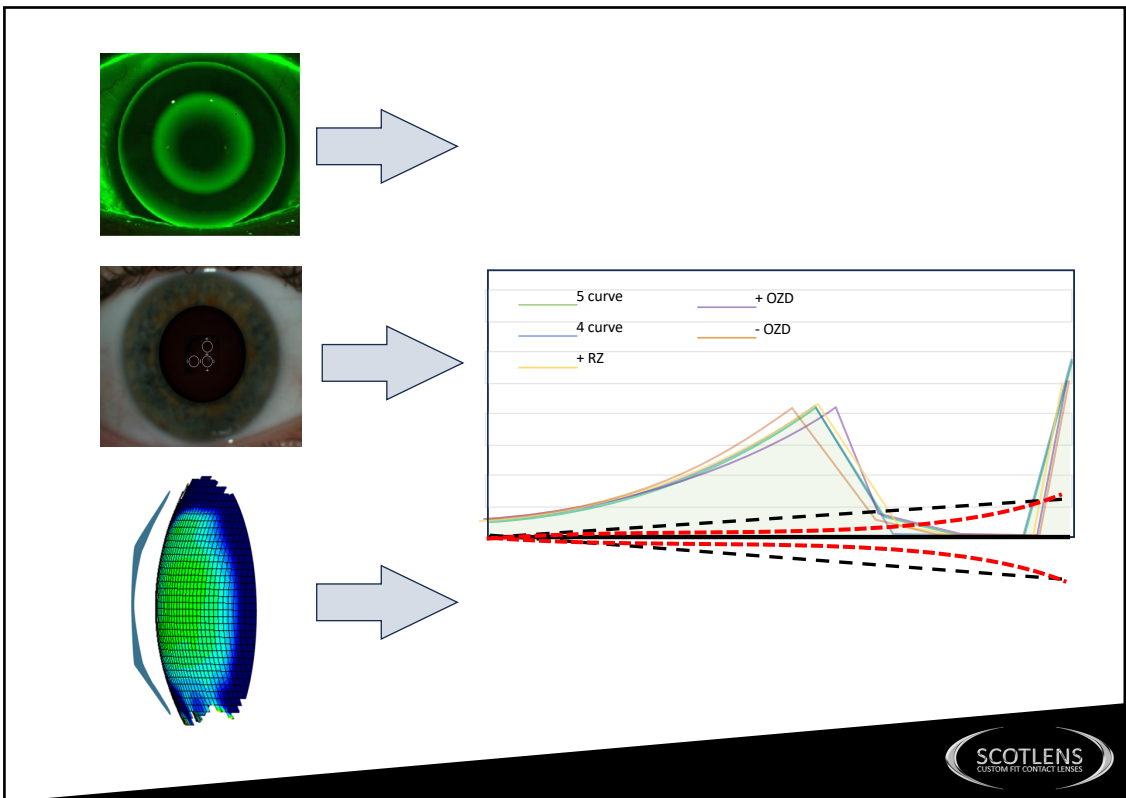
123



124

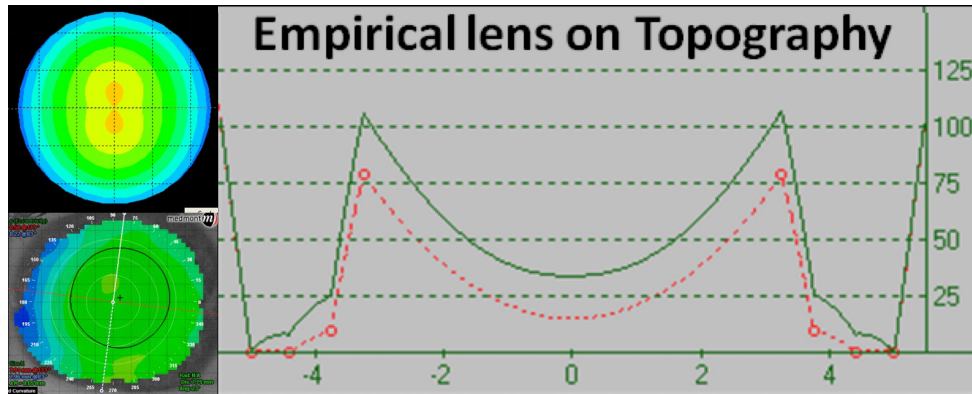


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Alignment Zone (AZ)

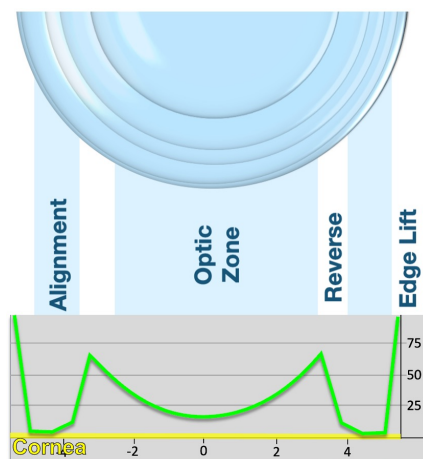


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Lens Design Summary

8.60:6.00/6.00:7.00/7.80:10.00/10.40:11.00/+1.00
 OZ RZ AZ EL FS Power

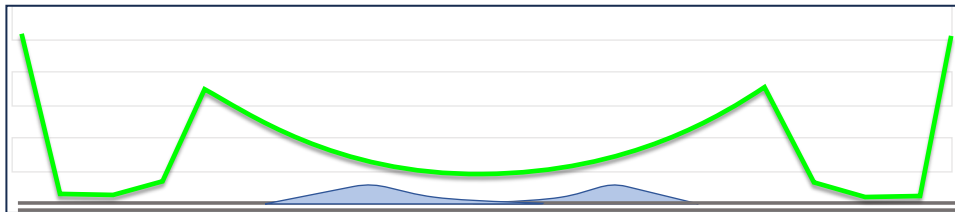
- OZ & RZ: Form the TZ
- RZ & AZ: Position lens on cornea
- FS Power: Cancels compression
 Plano DV
 Px can see DV with lens



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Corneal Change Summary

Corneal changes are epithelial –temporary
 Rx fades as day goes on day 1-5, stable at 2 weeks
 Wash out 90% by day 5, full wash out 1 month-
 Create a distance centre ‘multifocal’ cornea, Add = Target
 Rx
 20um thickness change limits Rx max correction



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Intro to OK Night Lenses – The Px Journey Summary

1 Points 1 Hours

Clinical practice

- Understand the different fitting processes used in fitting different ortho-k lenses.
- Understand the limitations, advantages and disadvantages of the fitting processes.
- Understand how a basic ortho-k lens parameter correlates to the cornea.
- Understand the refractive limitations of ortho-k with astigmatism.
- Understand optimum technique for ortho-k (and therefor GP corneal) insertion and removal.
- Understand the main care products available for ortho-k lenses and how they are used.

Specialty CPD - contact lens optician

- Understand optimum technique for ortho-k (and therefor GP corneal) insertion and removal.
- Understand the main care products available for ortho-k lenses and how they are used.
- Understand the symptoms and how solution toxicity can be identified, along with alterations to lens care that can benefit patients.



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DATE & TIME		FORMAT	VENUE	TITLE
JANUARY	21-22	WORKSHOP	EYECARE CONFERENCE	The Secret Life of the Cornea - what we do know and what we should know.
MARCH	6	WEBINAR		Myopia Management and control with specs, day lenses and orthok night lenses - the optical principles.
APRIL	3	WEBINAR		OrthoK Night Lens Fitting Intro - The Patient Journey.
	14	ROADSHOW	EDINBURGH	* See Roadshow next page
	25-27	WORKSHOP	EFCLIN CONFERENCE	
MAY	8	WEBINAR		Introduction to Irregular Corneal Contact Lens Fitting.
JUNE	5	WEBINAR		Ask Scott Anything!!
SEPTEMBER	8-9	ROADSHOW	BELFAST	* See Roadshow next page
OCTOBER	6	ROADSHOW	BIRMINGHAM	* See Roadshow next page
	16	WEBINAR		Topography for orthok night lens fitting. Baseline and subtractive assessments.



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