

MYOPIA AND OPTICA

Dr. Ann Debackere



MYOPIA AND EFFECTIVE MANAGEMENT SOLUTIONS

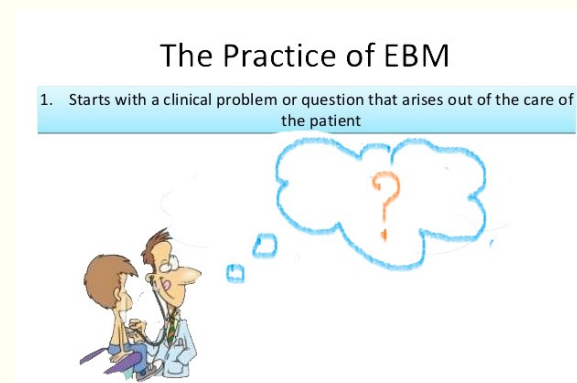
4 QUESTIONS FOR THE AUDIENCE :

-Who is prescribing bifocal/multifocal glasses to their myopic patients ?

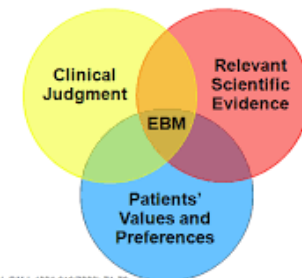
-Who is prescribing/adapting Ortho-K contactlenses to their myopic patients?

-Who would consider prescribing bifocal/multifocal glasses to their own children if myopia is rapidly progressing?

-Who would consider using Ortho-K contactlenses for their own children if myopia is rapidly progressing?



What Is Evidence-Based Medicine?



Sackett DL, et al. BMJ. 1996;312(7022):71-72.

MYOPIA AND EFFECTIVE MANAGEMENT SOLUTIONS

THE LITERATURE SAYS:

ACCOMMODATION REDUCTION AND UNDERCORRECTION DOES NOT SLOW DOWN MYOPIA

(Raviola et al, Sun et al

SCIENTISTS SAY:

THE USE OF ORTHO-KERATOLOGY IN CHILDREN IS OF GREAT RISK

(NOG = Dutch Ophthalmological Society)



HOWEVER: THIS IS THE REALITY:

Want to teach mathematics
want to look after people
I want to fly around the world

with Citius Preveincia™
Filter out harmful light

with Airwear™
Virtually unbreakable

CONTROL YOUR CHILDREN'S MYOPIA AND GIVE THEM A BRIGHTER FUTURE

myoPiLux^{Plus} | myoPiLux^{Itax}

FAR VISION
NEAR VISION

KEEP YOUR CHILD'S FUTURE IN FOCUS WITH MYOPI LUX[®] LENS



Ready to take on myopia

CooperVision

MiSight[®] 1 day contact lenses are proven to slow myopia progression by 59%*



MyoVision[™] by ZEISS

“the breakthrough spectacle lens that reduces myopia progression by 30 %”

blue-violet light Blocked by SenceFree

Filters blue light

Electronic Screen UV Light

Protect your eyes anytime, anywhere

Indoor LED Lighting

Filters blue-violet light

Blocks 99% of UV

UV Light Blocked by Armour UV

MYOPIA AND EFFECTIVE MANAGEMENT SOLUTIONS

SOLUTIONS THAT CORRECT MYOPIA BUT DO NOT CONTROL PROGRESSION :

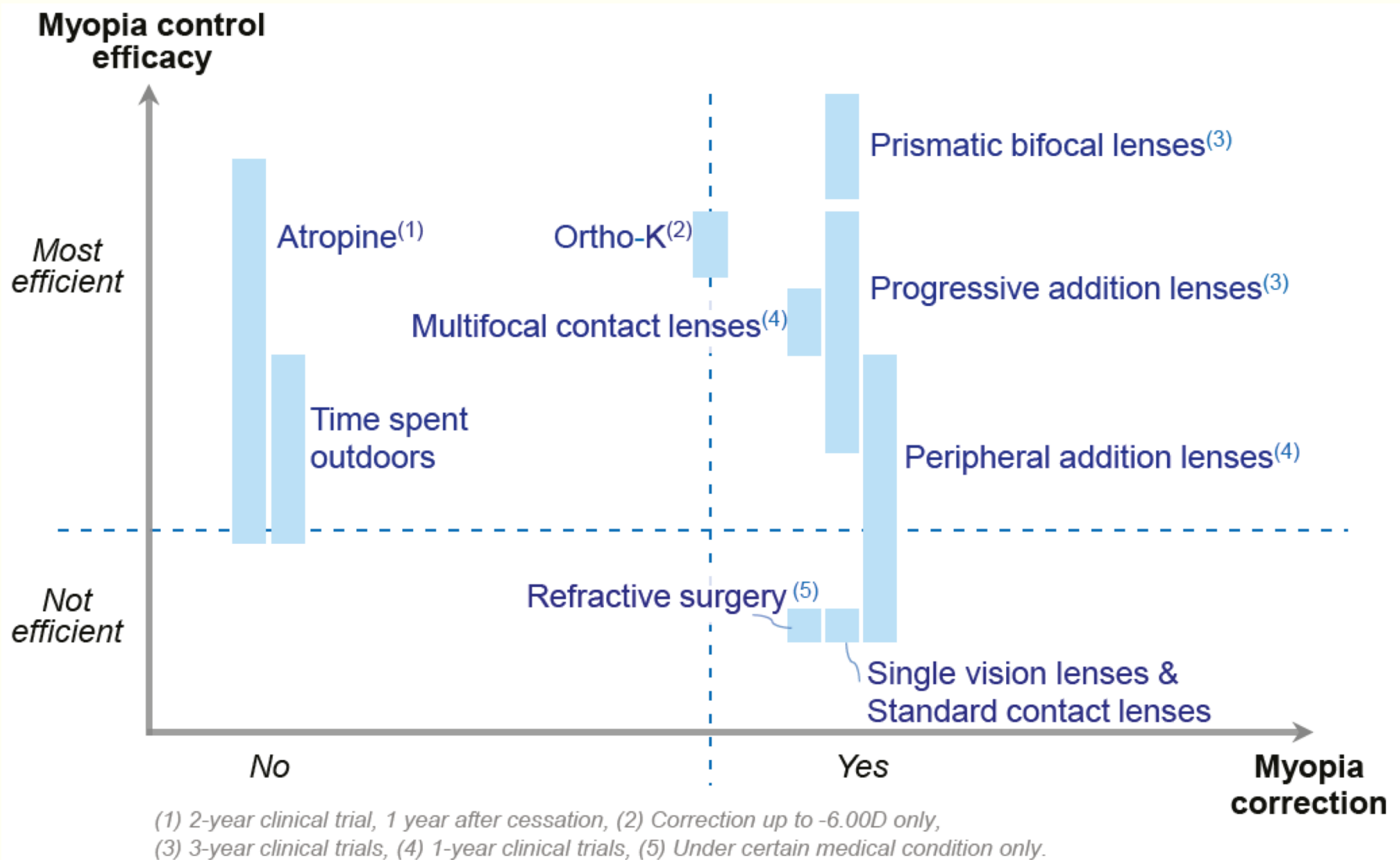
- Glasses with full optical correction
- Contactlenses with full optical correction
- (Refractive surgery)

SOLUTIONS THAT CONTROL MYOPIA BUT DO NOT CORRECT IT

- Outdoor activities
- The use of Atropine

SOLUTIONS THAT CORRECT MYOPIA AND CAN CONTROL MYOPIA PROGRESSION

- 1/Additional optical power for near vision
- 2/Peripheral addition contactlenses



MYOPIA AND OPTICA :

SOLUTIONS THAT CORRECT MYOPIA AND CAN CONTROL MYOPIA PROGRESSION

1/Multifocal and Bifocal correction +/- Prismatic correction:

The use of addition in the near vision zone compensates for accommodative lag (AL) in the myopic eye and the additional use of prismatic correction can compensate the lens induced exophoria

The special design of the lenses can neutralise the peripheral hyperopic defocus (PHD),

2/ Peripheral addition contactlenses

-CRT Corneal Refractive Therapy = Orthokeratology :

The use of special gaspermeable contactlenses during night time to press on and shape the cornea , as to diminish the axial lenght and to give a clear vision during daytime. The lens diminishes the peripheral hyperopic defocus (PHD), known as an element to provoke progressive myopia

-Soft daylenses with a special design to prevent myopia by neuralising the PHD

1/Multifocal and Bifocal correction +/- prismatic correction

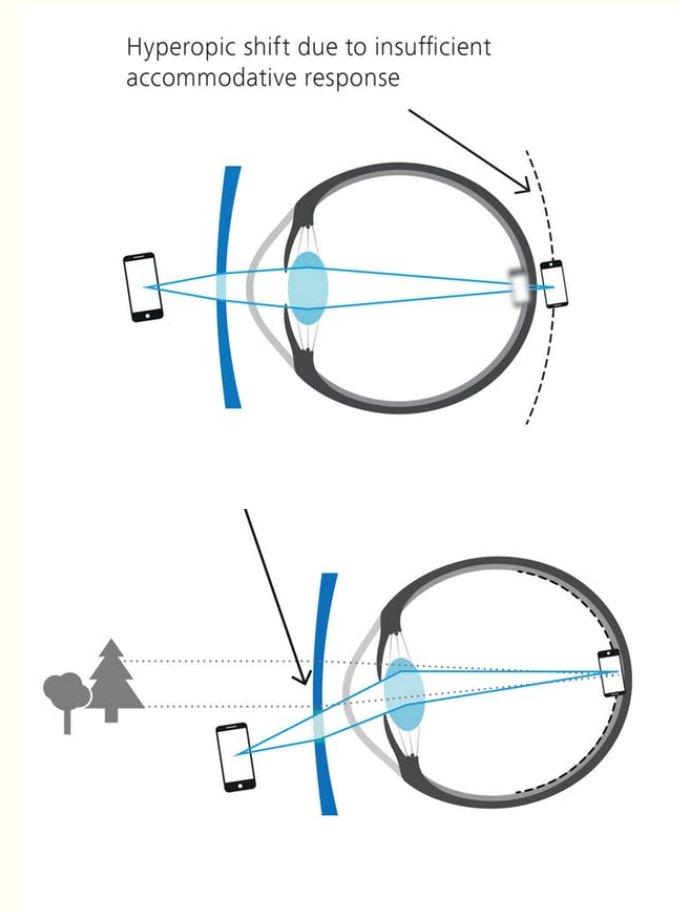
A/THE ACCOMMODATIVE LAG (AL)

It is the blurred image seen nearby in myopic eyes due to a low accommodative response

The accommodative lag can be responsible for myopia progression

The use of an addition compensates the lag

The addition used varies between +1,5 and +2,5 D (mean +2D)



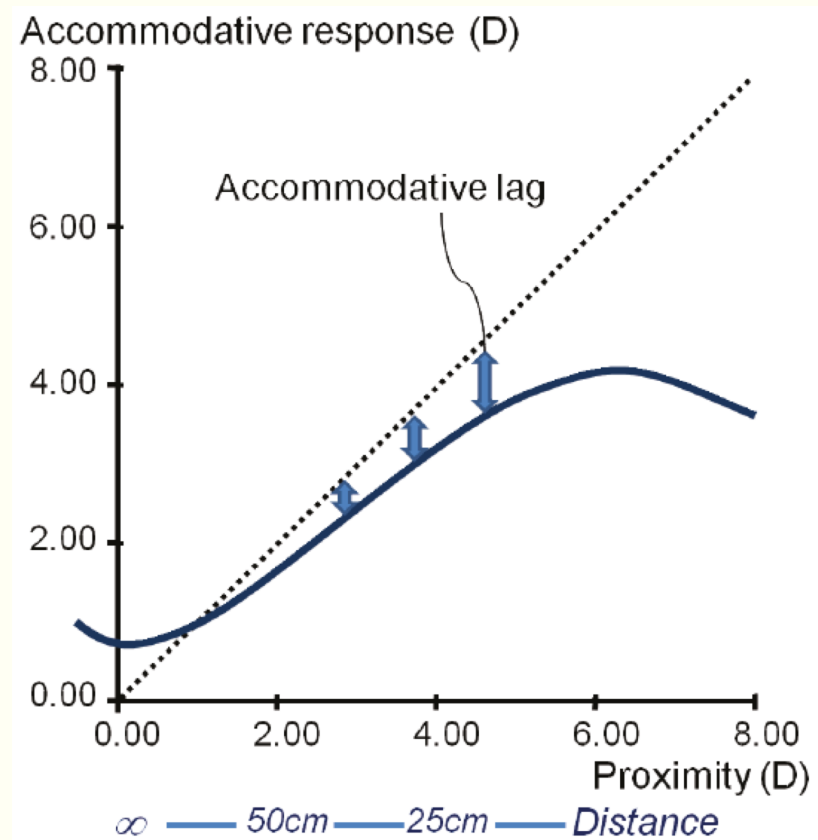
1/Multifocal and Bifocal correction +/- prismatic correction

A/THE ACCOMMODATIVE LAG (AL)

Accommodation augments
as the distance decreases

The accommodative lag increases
when looking clooser

Nl range at 30cm between +0,5 and +1 D



1/Multifocal and Bifocal correction +/- prismatic correction

- Measuring the Accommodative Lag with MEM (monocular estimated method) retinoscopy :
 - With full distance correction
 - At near distance (+/-40cm) ,
 - Using retinoscope with fixation target
 - Quickly swapping -/+ glasses until neutralisation
- <https://www.youtube.com/watch?v=Gox3nm669sE>



1/Multifocal and Bifocal correction +/- prismatic correction

B/THE USE OF A PRISMATIC CORRECTION

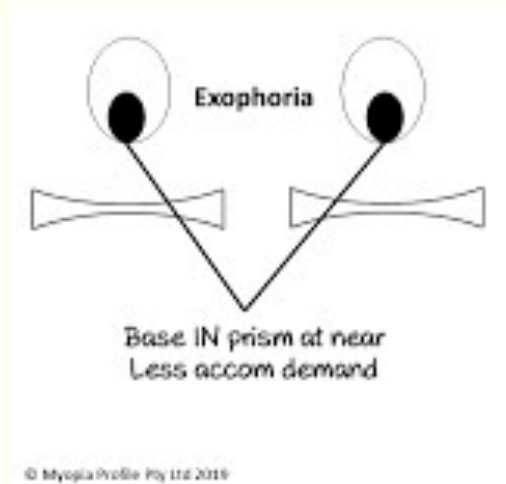
The + addition will provoke the eyes turning out

This can cause additional strain in exophoric /-tropic patients

And reduce the positive lens treatment effect

The additional use of Base-in Prisms can compensate this

The prism used is 3D Base-in bilateral



1/Multifocal and Bifocal correction +/- prismatic correction

THE COMET STUDY The Correction of Myopia Evaluation Trial 2003 Heyman L.

Is there a difference in the progression of myopia between children wearing progressive addition lenses (PALs Varilux Comfort) versus conventional single vision lenses (SVLs)

469 children 46% White, 26% African American, 14% Hispanic, and 8% Asian

ages 6-11 years with myopia in both eyes (spherical equivalent between -1.25 diopters (D) and -4.50 D, astigmatism \leq 1.50 D, and anisometropia \leq 1.00 D)

3year study

THE COMET 2 STUDY 2011

While statistically significant levels of slowing myopia progression in the treatment group (14% reduction in COMET, 24% reduction in COMET2), clinically meaningful reductions in myopic progression were not obtained.

Children where mainly esophoric and had a high lag of accommodation

1/Multifocal and Bifocal correction +/- prismatic correction

CANADIAN STUDY of Cheng and Woo and Essilor (JAMA 2014)

- 3year randomised clinical trial of 135 Chinese-Canadian children
- Age 8-13y mean age 10y old
- Mean myopia -3D with at least -0,5D progression in the previous year
- 3 groups
 - 1/single vision lenses
 - 2/+1,5bifocals
 - 3/+1,5 Bifocals with 2x3D Based in prisms

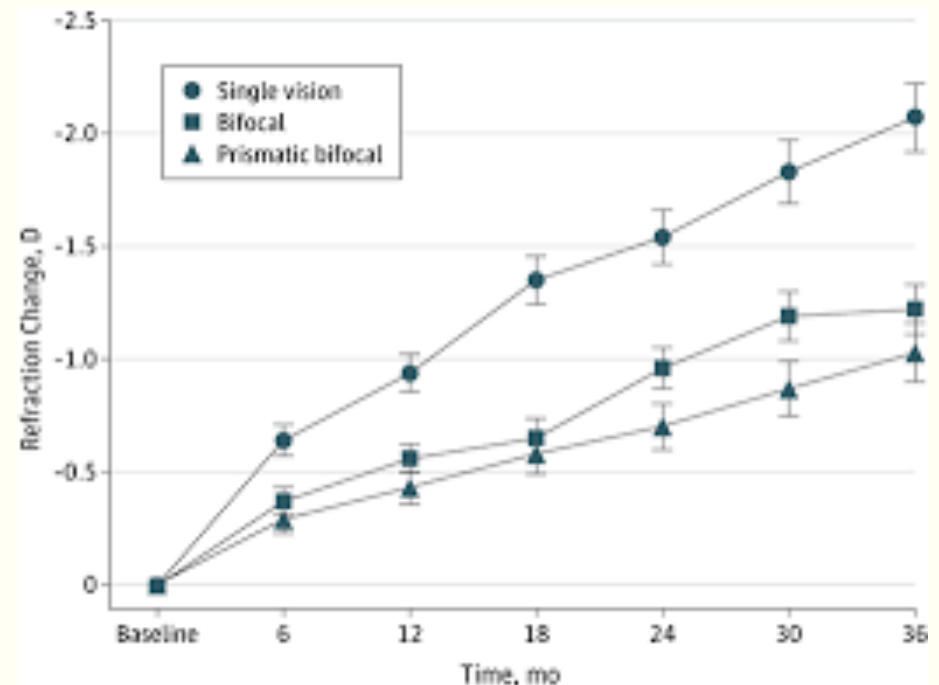
1/Multifocal and Bifocal correction +/- prismatic correction

CANADIAN STUDY of Cheng and Woo (JAMA 2014)

Up to 51% reduction of myopia progression)

-Especially in the prismatic group

-Especially efficient when the accommodative lag was low



1/Multifocal and Bifocal correction +/- prismatic correction

CANADIAN STUDY of Cheng and Woo (JAMA 2014)

Aim was to reduce nearby accommodation and convergence

Limitations:

Only Chinese children have been selected (living in Canada)

Only children with progressive myopia have been involved

Why is there a positive beneficial effect in this study ?

Is it because of the use of prismatic bifocals in exophoric children ?

Or because of the special lens design ?

1/Multifocal and Bifocal correction +/- prismatic correction

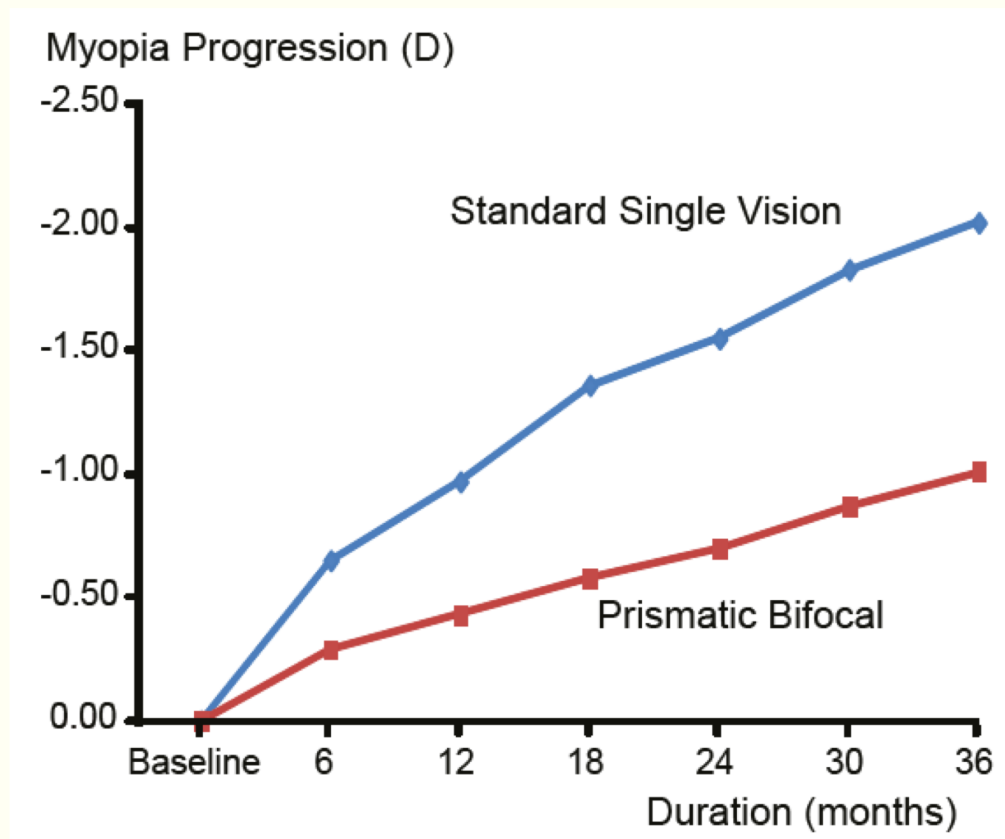
In orthophoric/esotropic children bifocals or multicocal glasses

In exotropic children the use of prismatic bifocals can be considered

Especially if they have a low AL

eg Myopilux MAX

till-6/Cyl-4/add+2 /3D based-in prisms



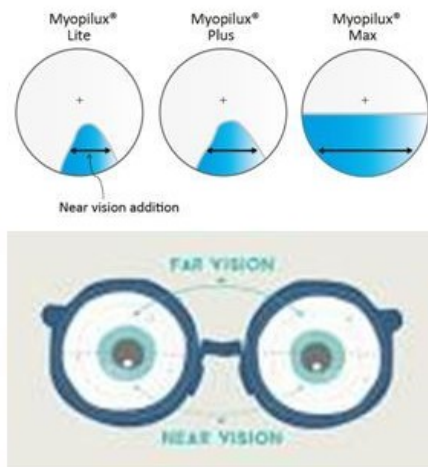
1/Multifocal and Bifocal correction +/- prismatic correction

BIFOCAL VERSUS MULTIFOCAL LENSES

- Although esthetically not so acceptable ‘
- Especially young children can benefit from bifocals , :
 - The segment line provides a feedback to the children to ensure that they use the reading portion of the bifocals whenever close work is performed.
 - The entire lower portion of the spectacles gives a greater visual field and as such, diminishes the lens-induced peripheral hyperopic defocus
- They are also cheaper

1/Multifocal and Bifocal correction +/- prismatic correction

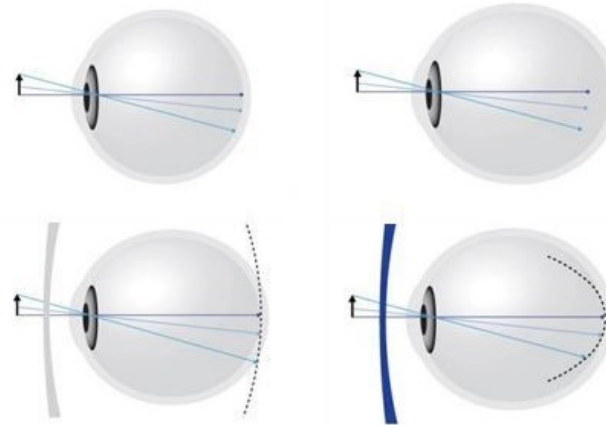
■ **COMMERCIALY AVAILABLE MULTIFOCALS FOR MYOPIC KIDS IN BELGIUM**



Essilor's website

- In a 2-year study amongst 87 children aged 7 and 13, it was found that Myopilux® spectacle lenses slowed down myopia progression by up to 62%

Carl Zeiss Vision, MyoVision™ Peripheral Vision Management Technology



Zeiss's website

- A 12-month wearer efficacy trial amongst 210 Chinese school children resulted in reducing progression of myopia by an average of 30% in a subgroup of 19 younger children (6 to 12 years old) with at least one myopic parent.* This is statistically significant

I have no
financial
disclosures



1/Multifocal and Bifocal correction +/- prismatic correction

ESSILOR

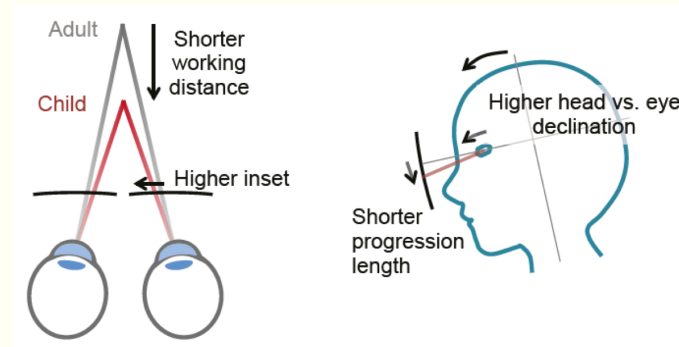
Myopilux® Lite:

Myopilux® Lite lenses are recommended for esophoric children with progressive myopia. Its design includes a progressive optical design, with a recommended addition of +2.00 D for better efficacy in myopia control

The lens is adapted to children's posture; its inset is higher (3-4mm above pupilcenter) and its progression length is shorter than those for adults.

Children do have a :

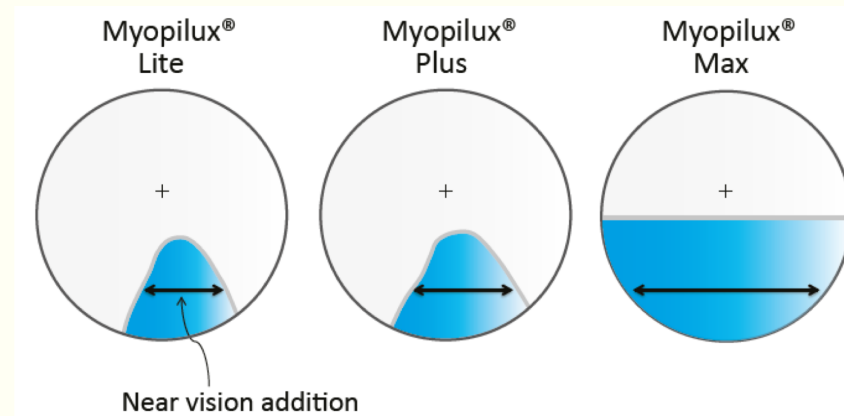
- shorter working distance
- a higher head versus eye declination



1/Multifocal and Bifocal correction +/- prismatic correction

Myopilux® Plus:

- Myopilux® Plus lenses should be chosen by parents looking for an advanced solution for their esophoric children with progressive myopia. In addition to Myopilux® Lite lenses, it is tailored to each child's specific visual ergonomics and benefits from Wave Technology point-by-point calculation. It ensures tailored lateral positioning of the whole visual zones for enhanced visual comfort and it provides the child with better visual resolution.



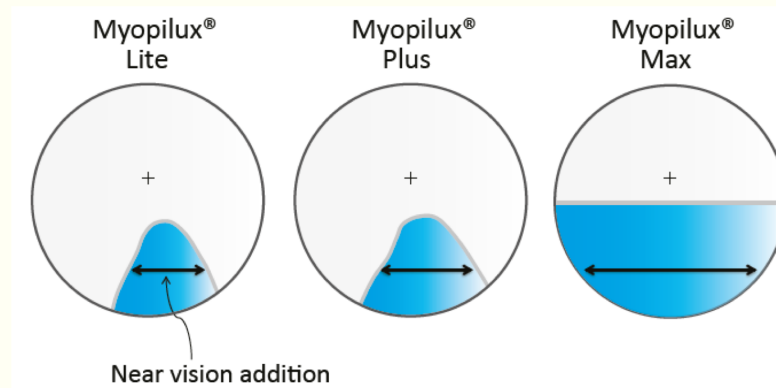
1/Multifocal and Bifocal correction +/- prismatic correction

▪ Myopilux® Max:

Myopilux® Max lenses are highly recommended for children whose myopia progression is more than -1.00 D per year.

Its design includes a prismatic bifocal made of two wide and aberration-free optical zones separated by a segment line :

- The upper part of the lens offers the visual correction adapted to the prescription.
- The lower part is dedicated to near vision with an addition of +2.00 D and 3D base-in prism



1/Multifocal and Bifocal correction +/- prismatic correction

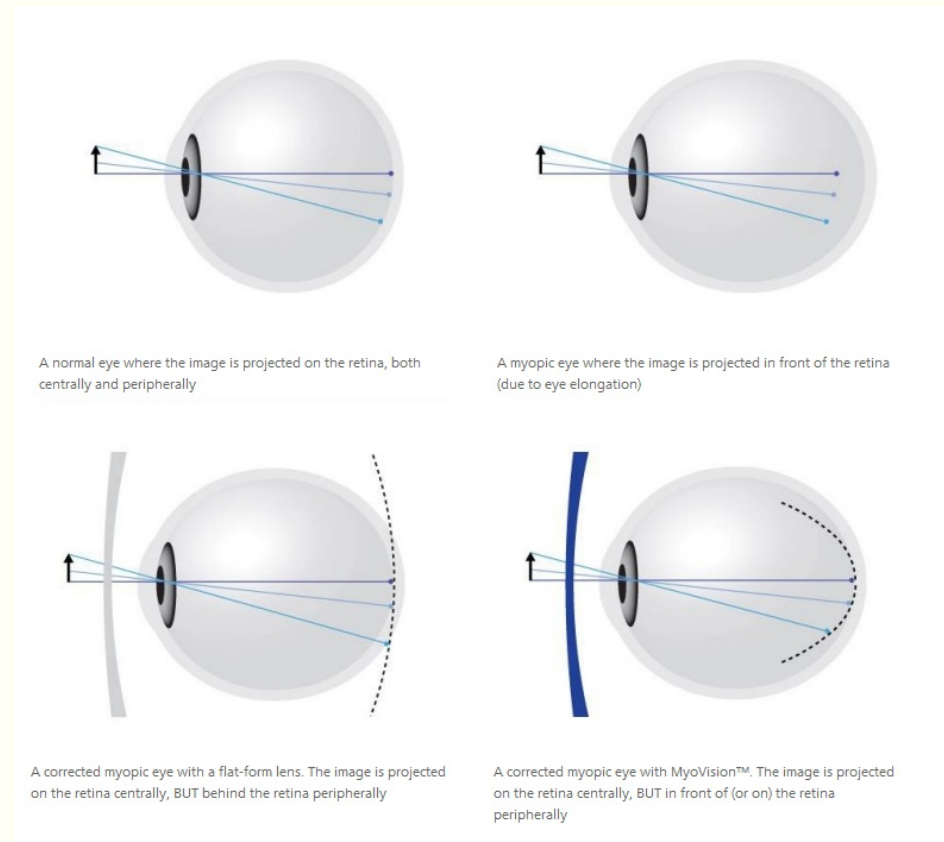
ZEISS

Myovision lenses

Single vision lenses with a special design to neutralise the peripheral hyperopic defocus

This can diminish myopia progression by 30%

ATTENTION this is not a multifocal and can not be prescribed as such for the RIZIV/INAMI



1/Multifocal and Bifocal correction +/- prismatic correction

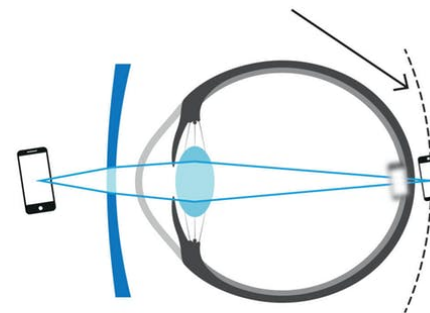
ZEISS

MyoKids lenses

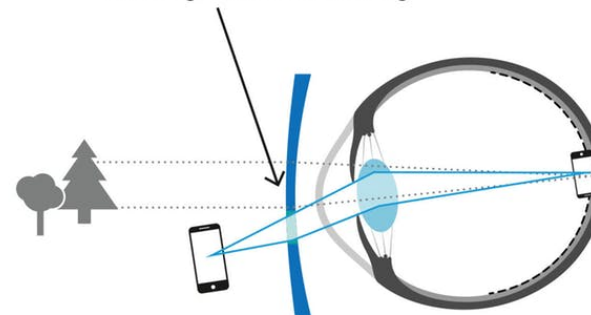
Multifocal vision lenses with a special design to neutralise the accommodative lag

This can diminish myopia progression by 30%

Hyperopic shift due to insufficient accommodative response



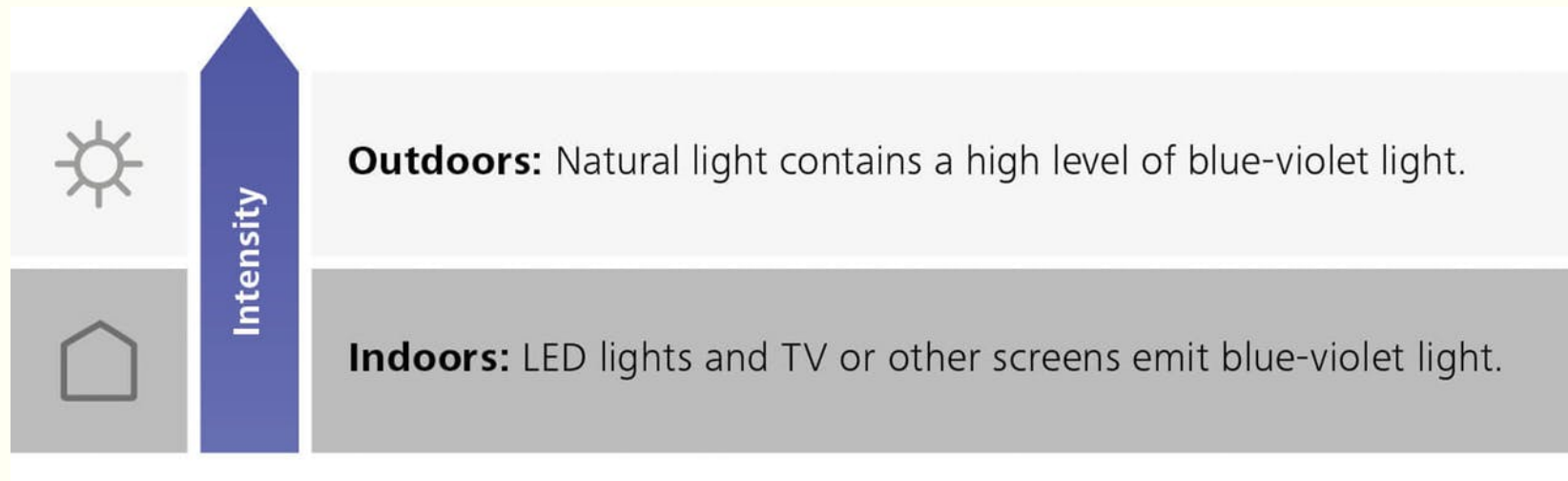
ADD power with special near vision design reducing accommodative lag



MYOPIA AND OPTICA : SOLUTIONS THAT CORRECT MYOPIA AND CAN CONTROL MYOPIA PROGRESSION

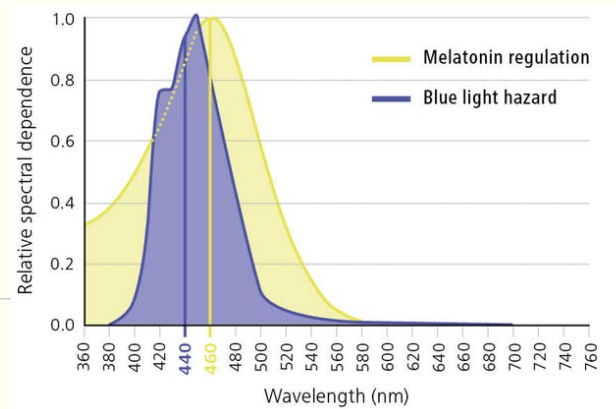
▪ WHAT ABOUT BLUE LIGHT FILTERS ?

Blue-violet light is everywhere, although its intensity varies greatly. While a typical LCD computer monitor produces a brightness of 250 candela/m², a clear blue sky at midday is 32 times as bright. Direct sunlight can be thousands of times as bright



MYOPIA AND OPTICA : SOLUTIONS THAT CORRECT MYOPIA AND CAN CONTROL MYOPIA PROGRESSION

Pro



Contra

Regulates circadian rhythm (day-night rhythm)

There is a body of evidence to suggest that blue light in the spectrum between 400 and 520 nm with a maximum at 460 nm is important for the proper regulation of melatonin in the body, which influences circadian rhythms (day-night rhythm) and general well-being.

Increases risk of macular degeneration

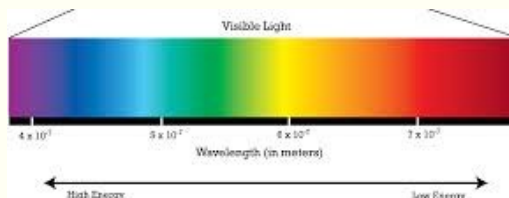
On the other hand, there is a body of evidence to suggest that long-term exposure to blue-violet light below 460 nm, with a maximum at 440 nm, may contribute to photochemical damage of the retina, increasing the risk of macular degeneration over time (known as the 'blue light hazard').

MYOPIA AND OPTICA : SOLUTIONS THAT CORRECT MYOPIA AND CAN CONTROL MYOPIA PROGRESSION

- Increased outdoor activity has an anti-myopic effect
- The spectrum of outdoor daylight contains more violet -blue -green than red .
- Blue light can have a protective factor against myopia progression (Foulds et al 2013)

However, blue light is overall in our LED society and is harmful to the retina

- A Japanese study showed that violet light (360-400nm near UV spectrum) can diminish the myopia progression in chickens and humans (Hidemasa 2017)



Quid Blue filter protection in glasses?

Quid UV protection including the violet light ?

2/Peripheral Addition Lenses

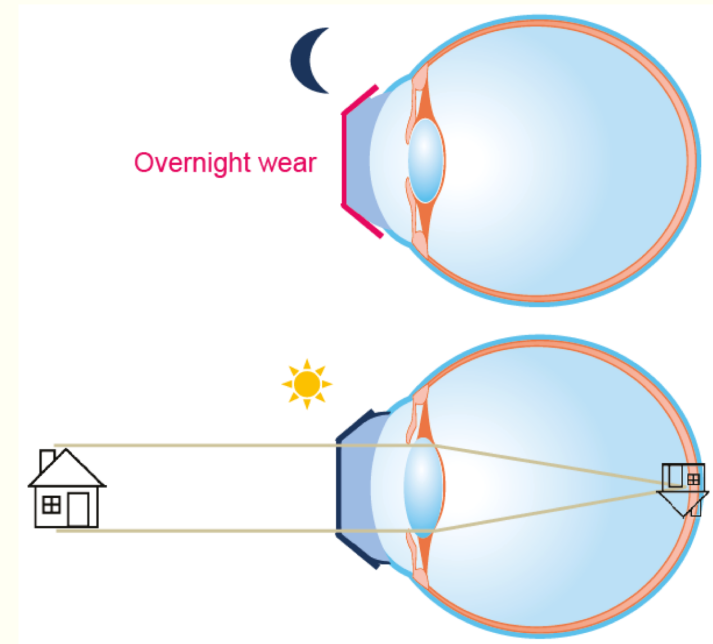
ORTHOKERATOLOGY

- Is the use of specially designed gas permeable contact lenses that are worn during sleep at night to temporarily correct myopia +/- astigmatism, so glasses and contact lenses aren't needed during waking hours.

= CRT Corneal Refractive Therapy

= VST Vision Shaping Therapy

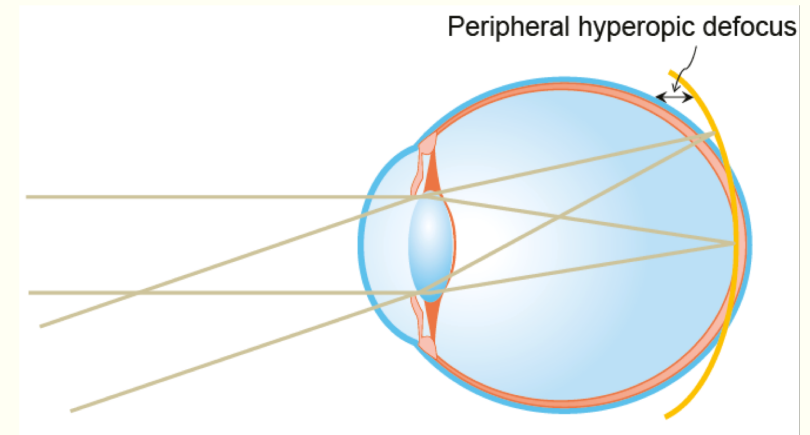
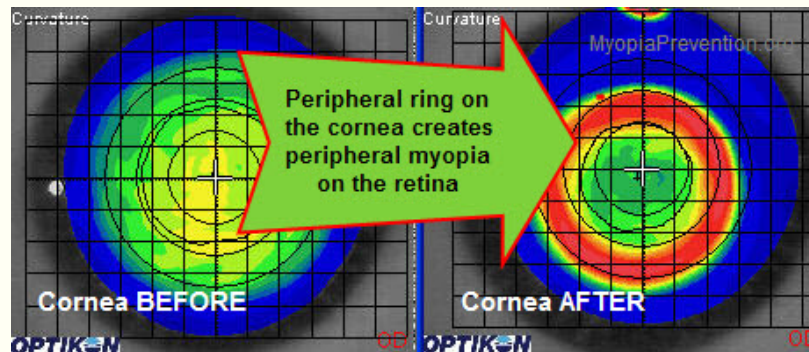
- Up to -6 D +/- 1,75 astigmatism



2/Peripheral Addition Lenses

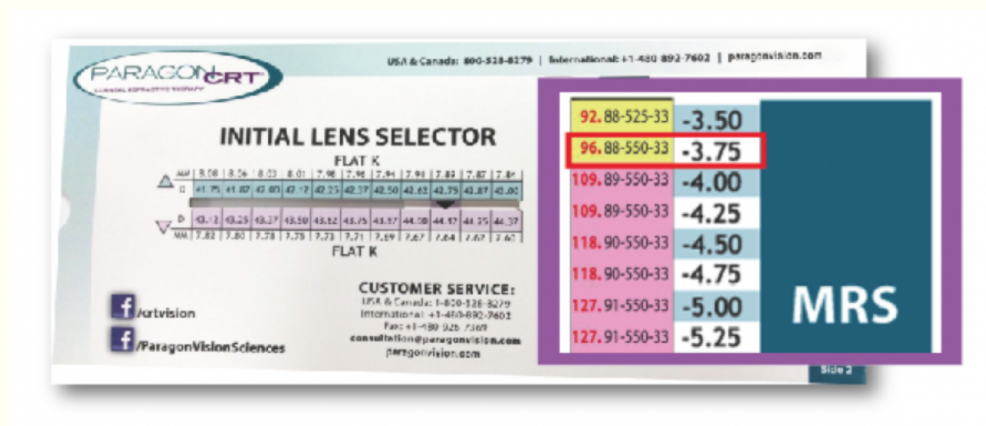
PERIPHERAL HYPEROPIC DEFOCUS

- Around 30° the rays are focused backwards, the image is fuzzy
- PHD can provoke myopia progression
- The lens design neutralises the PHD by myopisation of the defocus zone



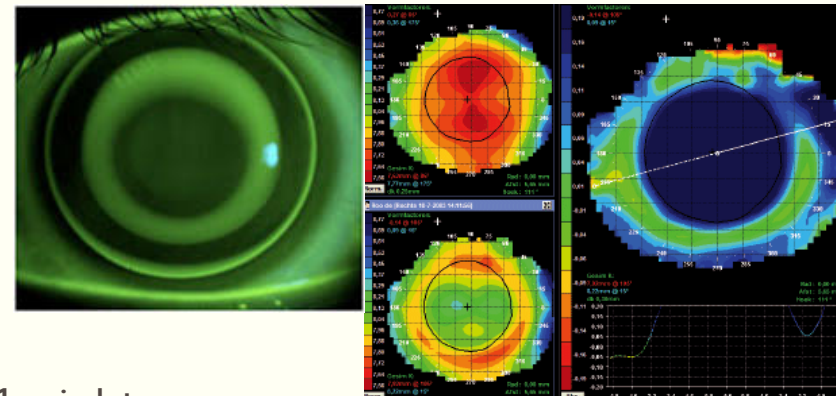
2/Peripheral Addition Lenses

- Lenses are adapted following the rules of the gaspermeable lenses
- Using correct keratometry and topography
- Special software and lens calculators are commercially available for the “Certified Adaptor”
- Corresponding lenses are tested with a “Diagnostic Dispensing System”



2/Peripheral Addition Lenses

- Strict fitting rules for central – and intermediate zones and edge
- Topography ‘Bulls-eye’ patterns shows optimal fitting
- Correct fitted lenses are ordered and worn 1 night
- Check up on day 1 with lens in place : correct or adapt
- Minimum 4 check-ups : Mobility? Staining? Oedema?
- Minimum 8h of nightwear

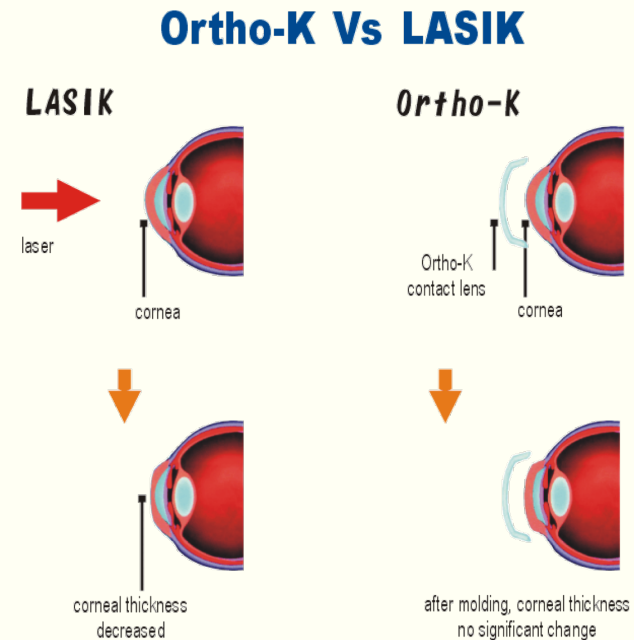


2/Peripheral Addition Lenses

- Ophthalmologists are not well informed about these therapeutic lenses in Europe
- There is a “mythic aura” around these lenses mostly adapted and sold by “certified” opticians

FOLLOW -UP ???

- Orthokeratology has long been competed by refractive surgeons



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2/Peripheral Addition Lenses

- **THE LORIC STUDY** Longitudinal orthokeratology research in children By Pauline Cho , Honkong, China 2005
- 2year study measuring baseline spherical equivalent refractive errors (SER) ,Axial length, (AL) Vitreous chamber depth (VCD)
- 35 kids between 7-12y old
- residual SER at the end of the study was -0.18 ± 0.69 D (diopetre) and the reduction (less myopic) in SER was 2.09 ± 1.34 D (all values are mean \pm SD).
- increases in AL were 0.29 ± 0.27 mm for the ortho-k and 0.54 ± 0.27 mm and control group ($p = 0.012$)
- increases in VCD were 0.23 ± 0.25 mm for the ortho-k and 0.48 ± 0.26 mm and control groups ($p = 0.005$)
- corneal reshaping has been shown to **halt the progression of myopia by nearly 50%**

2/Peripheral Addition Lenses

- TO SEE STUDY C. Chen, 2013
- 80 subjects (aged 6-12 years; ortho-k, 43; control, 37) with myopia of 0.50 to 5.00 diopters (D),
- 24months
- Axial elongation in ortho-k subjects was 52% slower than that in the control group

LIMITATIONS OF THESE STUDIES

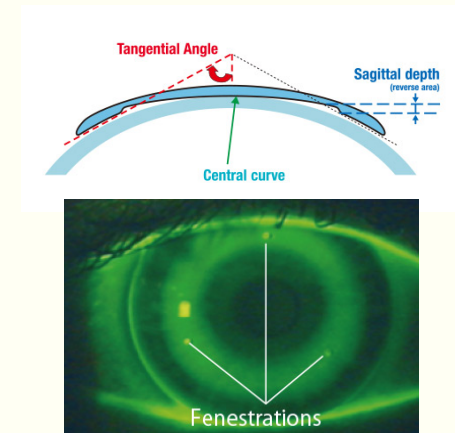
- Asiatic population
- Quid rebound effect after stopping the lenses (as know by studies in 1950's with rigid CL)?

2/Peripheral Addition Lenses

- **COMMERCIALY AVAILABLE CRT CONTACTLENSES IN BELGIUM**

-Procornea has a regular Dreamlite and a multifocal Dreamlite Zoom lens

-Menicon has a regular Z Night and a Z Night Toric lens and developed 3 fenestrations to allow better tear flow behind the lens. There is a pink right and left blue lens



2/Peripheral Addition Lenses

■ COMMERCIAL AVAILABLE SPECIAL SOFT CONTACT LENSES

-The lens design neutralises the peripheral defocus

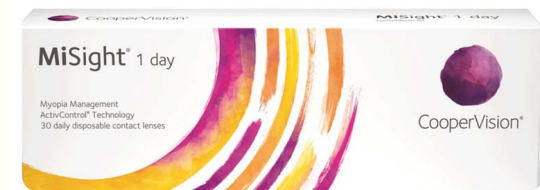
-1 Day lens with High DK (Cfr Proclear)

-Multifocal ring design

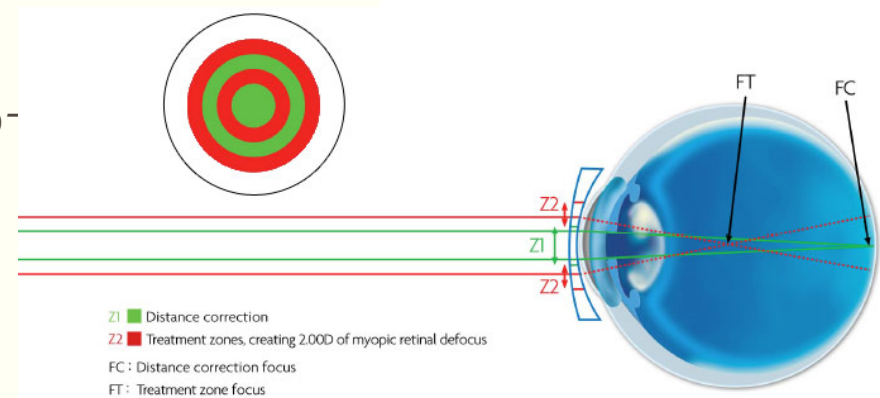
(shadowing can be seen)

-Range to -6D, no astigmatic correction

-Can reduce myopia progression to 59%-



New Myopia Control
Daily Disposable
Contact Lens



2/Peripheral Addition Lenses

WARNING !

HIGH RISK OF INFECTIONS WITH ORTHO-K LENSES

- 1. The ortho-K lens has a “reverse geometric design” and presses on the central cornea and gives more micro-epithelial defects . This is a “porte d’entree” for micro organisms
- 2. The special design of the lens blocks the tear flow underneath the lens and so there is less defence against micro organisms during blinking .
- 3. Micro organisms have more time during the night to colonise the contactlens, to adapt to the environment and to develop virulence

Higher risk of complications in children

Less compliance in children



“De Corneawerkgroep van het NOG maakt zich grote zorgen over de toepassing van nachtlenzen (ortho-K) bij kinderen. De corneawerkgroep heeft het standpunt ingenomen dat zij nachtlenzen bij kinderen krachtig afwijst.”

MYOPIA AND OPTICA : SOLUTIONS THAT CORRECT MYOPIA AND CAN CONTROL MYOPIA PROGRESSION

IN SUMMARY :

THE USE OF SPECIAL OPTICAL SOLUTIONS FOR MYOPIA TREATMENT

CAN BE BENEFICIAL, ESPECIALLY IF THERE IS A RAPID PROGRESSING MYOPIA

- In children (to young for contactlenses)

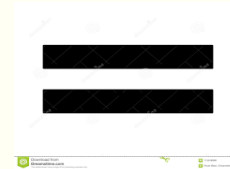
If exo, especially with low AL, the use of prismatic bifocals can be considered

In orthophoric/eso children, especilally with high AL : bifocals or multicocal glasses can be considered

- For older motivated children Ortho K lenses can be considered under strict hygienic conditions and by an experienced adaptor.

MYOPIA AND OPTICA : SOLUTIONS THAT CORRECT MYOPIA AND CAN CONTROL MYOPIA PROGRESSION

- 1.4 billion people worldwide were nearsighted in 2000. (23 percent of the total global population)
- But by 2050, nearly 4.8 billion (49.8 percent) of the global population will be myopic
- This is a enormous commercial market !!!



MYOPIA AND OPTICA : SOLUTIONS THAT CORRECT MYOPIA AND CAN CONTROL MYOPIA PROGRESSION

WARNING : COMMERCIALISATION OF MYOPIA !

STUDIES CAN BE INFLUENCED BY COMPANIES

- eg Essilor (France) Varilux
- eg Procornea (Netherlands) Ortho K
- eg Menicon (Japan)

COST OF THESE CORRECTIONS FOR THE PARENTS

MULTICAL/BIFOCAL GLASSES 80€-500€/glass ! + Frame !

ORTHO K LENSES 300-500€ and more

- keep in touch with the optician
- advise parents to ask for a clear prize proposal!



MYOPIA AND EFFECTIVE MANAGEMENT SOLUTIONS

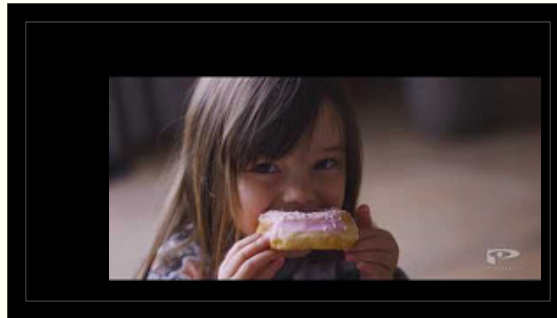
CONCLUSIONS: LET'S OPEN OUR EYES



- The impact of myopia progression in children is extremely important.
- Paediatric ophthalmologists all over the world should work together to focus on prevention, adapted therapies and follow-up.
- Paediatric ophthalmologists should be better informed and study the therapeutic possibilities (also optical)
- There is a need for guidelines (national and international)
 - To inform ophthalmologists, orthoptists , pharmacists and opticians
 - To inform parents and children
- There is a need for independant “evidence based” studies without commercial influence, especially in the Caucasian population.

MYOPIA AND OPTICA : SOLUTIONS THAT CORRECT MYOPIA AND CAN CONTROL MYOPIA PROGRESSION

- https://www.youtube.com/results?search_query=https%3A%2F%2Fyoutu.be%2Fbm92mg2rz74
- <https://youtu.be/bm92mg2rz74>



THANK YOU FOR YOUR ATTENTION !



MYOPIA GUIDELINES IN BELGIUM

