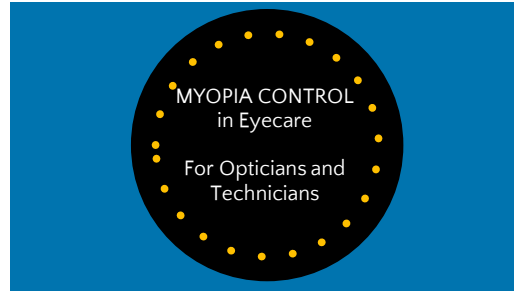
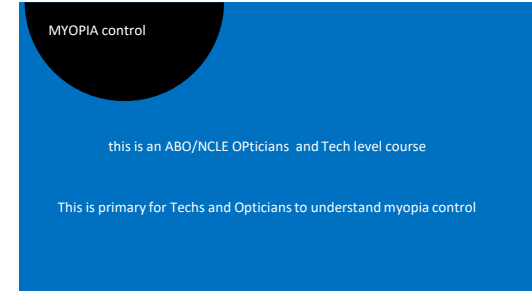




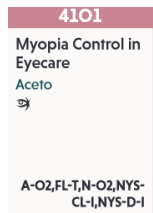
1



2



3



If you are an OD, this is NOT COPE approved (see brochure).  
Needs to have "C" to designate COPE approval

4



5



6

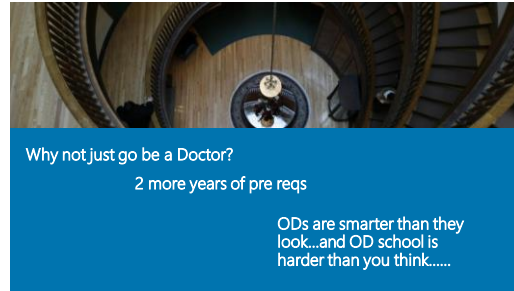


Open my own chain of opticals (started with 2)

OD fell ill...couldn't find a new Doc

Sort of stuck.....

7



Why not just go be a Doctor?

2 more years of pre reqs

ODs are smarter than they look...and OD school is harder than you think.....

8

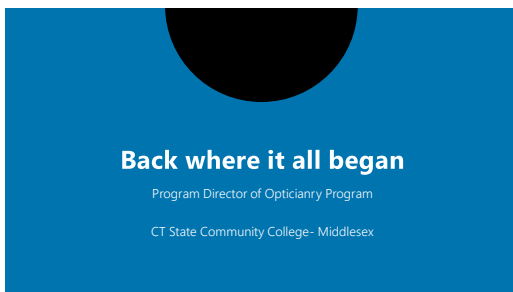


9

From Private Practice...

To Academia...

Involved with the development of 2 new Optometry Schools



**Back where it all began**

Program Director of Opticianry Program

CT State Community College- Middlesex

10



**Dedicated my career to the education of Opticians, Technicians and associate staff.**

11



**The staff is the HEART AND SOUL of a practice..**

**Potentially more important than the Doctors**

12

Whether you are staff at a Doctors Office,  
 Or  
 an Optician (private practice corporate, etc)..  
 You MUST be the expert to communicate to the patients

13

MYOPIA control

Opticians and Technicians will be front line providers of most of the strategies that address Myopia Control

Will be instrumental in educating patients and their parents

NEED TO BE EDUCATED ON SUBJECT

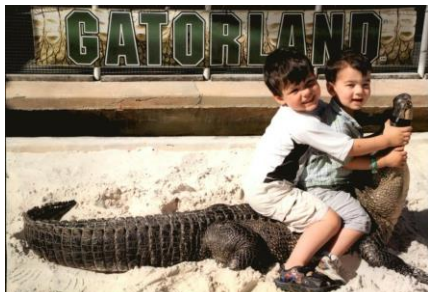
14

“

When I was 5 years old, my mother always told me that happiness was the key to life. When I went to school, they asked me what I wanted to be when I grew up. I wrote down "happy". They told me I didn't understand the assignment, and I told them they didn't understand life.

—John Lennon

15



16

MYOPIA control

Myopia control has been in the forefront of Optometry Education and Research since the 2000's

Better UNDERSTANDING the problem and causes, and

STRATEGIES to reduce or slow the issue.

17

MYOPIA control

Opticians have been strangely silent and absent from the process (studies, research, implementation of strategies)

This class is to help familiarize Opticians and Techs to the world of Myopia Control

18

MYOPIA control

Optician Colleague I spoke with on Myopia control...

Skeptical....



19

Why are we here?

What is Myopia?

Is it getting worse?

Does worsening Myopia lead to higher likelihood of other problems?

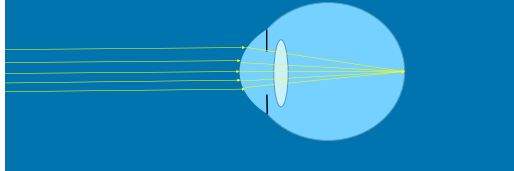
Is there anything we can do to help the issue?

20

EMMETROPIA When rays are focused Exactly on the Retina

conditions:

- Light rays must be from optical infinity (6m or 20ft)
- Eye MUST be relaxed (lens must NOT be focusing/no accommodation)



21

How does the anatomy of the eye contribute to Refractive error?

AMETROPIA When rays are NOT focused Exactly on the Retina

conditions:

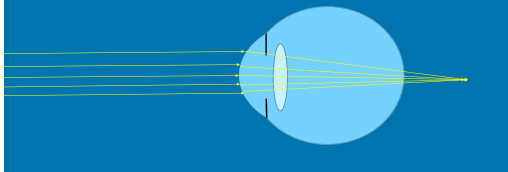
- Light rays must be from optical infinity (6m or 20ft)
- Eye MUST be relaxed (lens must NOT be focusing/no accommodation)

22

Hyperopia When rays are focused BEHIND the Retina

conditions:

- Light rays must be from optical infinity (6m or 20ft)
- Eye MUST be relaxed (lens must NOT be focusing/no accommodation)

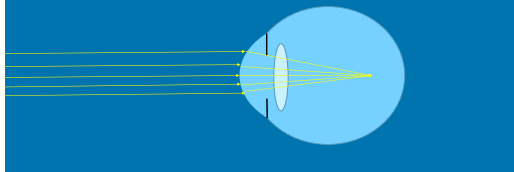


23

Myopia When rays are focused IN FRONT on the Retina

conditions:

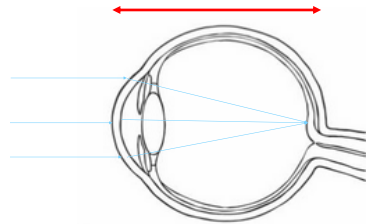
- Light rays must be from optical infinity (6m or 20ft)
- Eye MUST be relaxed (lens must NOT be focusing/no accommodation)



24

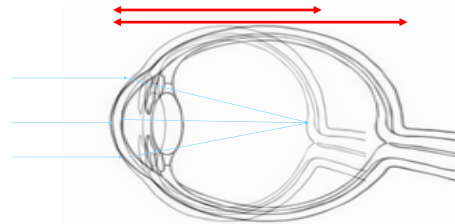
What factors can lead to myopia?  
Refractive power too strong  
OR  
Axial Length Too LONG

25



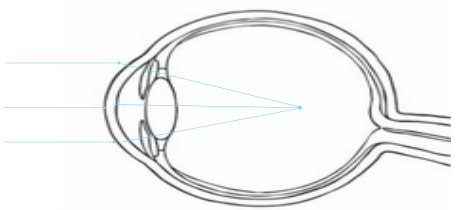
26

<https://en.wikipedia.org/wiki/Near-sightedness>



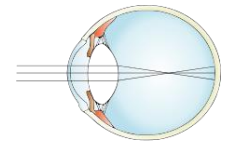
27

<https://en.wikipedia.org/wiki/Near-sightedness>



28

<https://en.wikipedia.org/wiki/Near-sightedness>



29

<https://en.wikipedia.org/wiki/Near-sightedness>

**Myopia (NEAR SIGHTED)**  
Corrected with MINUS lens / DIVERGING lens to allow light to focus on Retina

A diagram showing a blue diverging lens (concave) placed in front of an eye. Three parallel blue light rays enter from the left, pass through the lens which causes them to diverge, then pass through the eye's lens and converge exactly on the retina. The eye is shown with a normal axial length.

30

Development of young eye

Patients, on average, don't START myopic

31

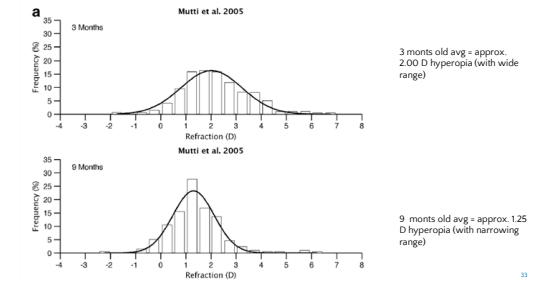
Development of young eye

Generally the average infant is born hyperopic.

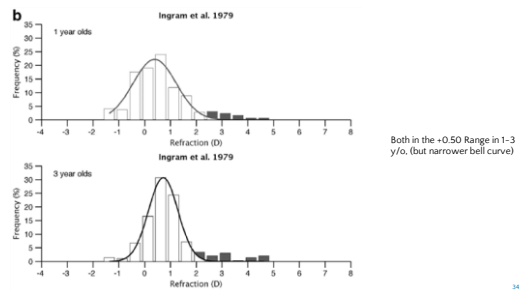
From 6-9months, the amount of hyperopia is reduced

Emmetropization

32



33



34

From Basic Anatomy

WHY DON'T we see a ton of mildly hyperopic Rx's in this age group?

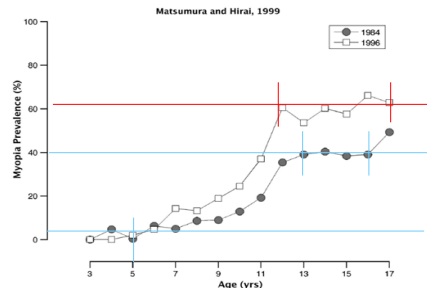
AMAZING ABILITY TO ACCOMODATE

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10289054/>

35

It's now in adolescence that we start to see myopia develop

36



37

From Dispenser's perspective;  
 Why we see 9-14 y/o coming in for first time glasses (fewer than infants/preschool age)  
 Change can be sudden, and surprise for parents

38

Another example on WHY we MUST ABSOLUTELY have children seen by their eye doctors (OD or OMD) regularly  
 "my kid's never needed glasses"  
 "school did the exam"  
 "Checked at the pediatrician"

39



BIG DEAL???

JUST WEAR GLASSES

Or Contacts 😊

<https://endmyopia.org/2-00-child-myopia-prevention-glasses/>

40

Problem? Why is Myopia a problem?

- Risk of pathology INCREASES SUBSTANTIALLY IN MYOPIA
- Myopiogenic factors are more prevalent now than in any other time in history
- Incidence, prevalence and severity of Myopia is INCREASING...

41

myopia as a minor issue to be corrected  
 VS.  
 now a serious health issue with potentially serious long term complications

42

Risk of Ocular pathology

Maculopathy		Retinal Detachment		PSC		Glaucoma	
Rx	Odds Ratio	Rx	Odds Ratio	Rx	Odds Ratio	Rx	Odds Ratio
-1.00 to -3.00	2.2	-0.75 to -2.75	3.1	-1.00 to -3.50	2.1	-1.00 to -3.00	2.3
-3.00 to -4.99	9.7	-3.00 to -4.75	9.0	-3.50 to -6.00	3.1	>-3.00	3.3
-5.00 to -6.99	40.6	-6.00 to -8.75	21.5	>-6.00	5.5		
-7.00 to -8.99	126.8	9.00 to -14.75	44.2				
>=-9.00	348.6	>=-15.00	88.2				

<https://newgradopometry.com/myopia-control/>

Figure D: The complex interactions of retinal, optical and environmental factors in myopia aetiology. Prog Retin Eye Res 2012;31:622-60.

43

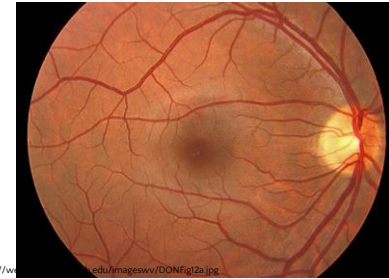
Risk of Ocular pathology

Maculopathy		Retinal Detachment		PSC		Glaucoma	
Rx	Odds Ratio	Rx	Odds Ratio	Rx	Odds Ratio	Rx	Odds Ratio
-1.00 to -3.00	2.2	-0.75 to -2.75	3.1	-1.00 to -3.50	2.1	-1.00 to -3.00	2.3
-3.00 to -4.99	9.7	-3.00 to -4.75	9.0	-3.50 to -6.00	3.1	>-3.00	3.3
-5.00 to -6.99	40.6	-6.00 to -8.75	21.5	>-6.00	5.5		
-7.00 to -8.99	126.8	9.00 to -14.75	44.2				
>=-9.00	348.6	>=-15.00	88.2				

<https://newgradopometry.com/myopia-control/>

Figure D: The complex interactions of retinal, optical and environmental factors in myopia aetiology. Prog Retin Eye Res 2012;31:622-60.

44



<https://www.fdu.edu/magevsv/DONfig2a.jpg>

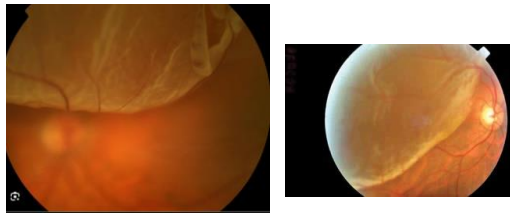
45

Fig. 3. Myopic macular degeneration



Source: Hayashi et al. (33), presented by K. Ohno-Matsu during the meeting.

46

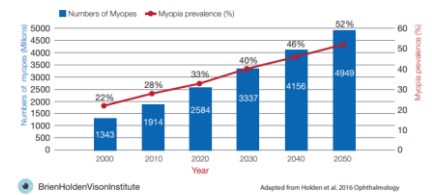


<https://timothyjackson.london/patients/retinal-detachment/>

<https://www.cebjournal.org/article/retinal-detachment/>

47

Results: Myopia - Now and in 2050

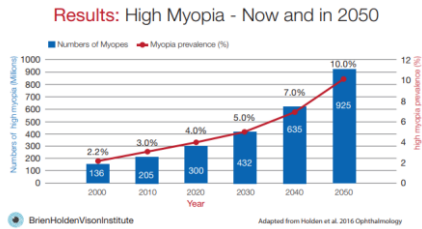


Brien Holden Vision Institute


Adapted from Holden et al. 2016 Ophthalmology

48





49

**Americans** 

Myopia prevalence

2015 = 42%

1971 = 25%

50

East Asians = 70% by 15 years old

23% over last decade..

51

**Australia** (recent study) 

31% of 17 year olds were myopic

DOUBLE the prevalence reported 10 years ago another study

Sydney Myopia study vs Blue Mountain study



<https://bj.o.bmj.com/content/100/7/882>

52

Almost  
**5 billion**  
myopes by 2050

53

**WHY?**

We've established it's happening..

What is Causing it?

54

Heredity

Mom and Pops...

55

Genetics...

Previously though 20-40  
genetic factors for myopia

2018 study found 161 genetic factors

Cream Study (consortium for refractive error and myopia)

56

Genetics...

Although in greater numbers, having more genetic  
risk factors may increase risk of myopia by 10X

57

## ENVIRONMENTAL

Time Spent Outdoors = Lower risk of  
becoming myopic

Prescribe your pediatric pts outdoor  
activity

58

CLEERE study (collab. Long. Eval of ethnicity and ref error)

- Children in urban environ 2.6x more likely than rural

59

## Multiple studies show

↑ outdoor time = ↓ incidence of myopia

2009 Chinese study, 40 minutes of outdoor over 3 years = 25 %  
decrease incidence of myopia (39.5 to 30.4)

Taiwan, 80 minutes of outdoor time per day could = 50% decrease  
incidence

Hsu M, Xiang F, Zeng Y, Mai J, Chen Q, Zhang J, et al. Effect of Time Spent Outdoors at School on the Development of Myopia Among Children in China: A Randomized Clinical Trial. *JAMA*. 2015; 314(18):1922-8. Wu HC, Tsai CL, Wu HL, Yang YH, Kuo HK. Outdoor activity during class recess reduces myopia onset and progression in school children. *Ophthalmology*. 2013; May;120(5):1080-5.

60

### Does sunlight :

- promote chemical signals that prevent axial elongation?
- Trigger genetic expression?
- Possibly farther working distance than indoors?

<http://www.datedsystems.org/terms/13/curriculum-with-nearwork-01ppt-148>

61

### Near Work and myopia

One study showed potential for:

2% increase in risk for every DIOPTR-HOUR near work per week

62

accommodative lag increases as working distance DECREASES

stimulus for the eye to elongate...myopia progression

Risk of developing myopia increases as: working distance is shorter amount of near work is greater.

<https://www.protonfocus.com/article/myopia-and-effective-management-solutions>

63

### GENETICS

Near work

Sunlight

Ethnicity

Other...

Children of East Asian ethnicity have a faster myopic progression rate and demonstrate more robust outcomes with interventions aimed at slowing the progression of the condition.

<https://www.asea.org/AOM/14/curriculum/Advancing-Myopia-Management-2024-02-14>

64

Table 2  
Myopia risk factors.

	Relationship	Main Findings	Related Factors
Parental myopia	Strong	Two myopic parents: +5 odds* [26,27]	Gene-environment interaction
		One myopia parent: +2 odds* [26,27]	
Education	Strong	School length and the performance intensity associated [48,49,50,51]	Near work Accommodative lag
		Near work	Education Accommodative lag
Time outdoors	Strong	Continuous reading (>30 min): +1.5 odds* [62]	Light exposure, dopamine release, vitamin D, and increased depth of field
		Closer reading distance (<30 cm): +2.5 odds* [62]	
Light exposure	Moderate	Time outdoors between 40-80 min associated with reduced myopia incidence [17,91,92,93]	Dopamine release, vitamin D, and increased depth of field
		Slower axial elongation is associated with greater daily light exposure (>3000 lux) [85,95]	
Life environment	Weak	Higher myopia prevalence in urban environments [44,100,103,104,105]	Education, near work, and time outdoors

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1002229/>

65

### SO HOW DO WE STOP

(or more accurately SLOW)

this process?!?!

66

What can we do?

- | 1   | 2  | 3  | 4  | 5                                  |
|---|--|--|--|------------------------------------|
| <b>Do Nothing?</b>                                      | <b>Ophthalmic Lenses</b>                         | <b>ORTHO K</b>   | <b>Multifocal CL</b>                             | <b>Atropine Drops</b>              |
| Give regular distance Rx in specs or CL<br><br>BAD IDEA | PAL vs Execs<br><br>SV peripheral defocus lenses | Overnight reshaping Contact Lenses<br><br>Invisaligns for your corneas | Specifically DISTANCE CENTER Multifocal Contacts | Yes, Dilating drops...just diluted |

67

Pharmacological



68



$$\frac{100}{10000} = 0.01\%$$

0.01% (or 0.05%)

69

Studies have shown repeatedly that LOW dose Atropine can slow (not reverse or stop) Myopia

Dilating = 1%

Study comparing 0.5%, 0.1%, and 0.01%

<https://www.aao.org/assets/28fe020e-593-4416-ae4-889e6cb16b2/63583350520280000/atropine-for-myopia-5-yr-clinical-trial-ophthalmology-2015.pdf?inline=1>

70

Studies have shown repeatedly that LOW dose Atropine can slow (not reverse or stop) Myopia 2015

0.01% = BETTER TOLERATED

0.01% = more effective

<https://www.aao.org/assets/28fe020e-593-4406-ae1-889e6cb16b2/63583350520280000/atropine-for-myopia-5-yr-clinical-trial-ophthalmology-2015.pdf?inline=1>

71

Studies have shown repeatedly that LOW dose Atropine can slow (not reverse or stop) Myopia

NOW 0.02 % showed better efficacy than 0.01%

[https://www.aaojournal.org/article/S0161-6420\(19\)32356-5/fulltext](https://www.aaojournal.org/article/S0161-6420(19)32356-5/fulltext) 2019 0.05

<https://www.nature.com/articles/s41598-021-0708-7> 2021 0.02

72

Low dose ATROPINE

Method of action?  
Compared to peripheral defocus, sunlight or genetics?

Seems to be ↑ in dopamine

73

• dampening vital functions of the retina, atropine boosts dopamine release from cellular stores, which then controls eye growth.

• In experimental animal studies, **the use of either dopamine (or nonselective dopamine receptor agonists) was found to inhibit the development of myopia**

• <https://reviewofmm.com/mechanism-of-action-of-atropine-in-controlling-myopia-progression/>

74

## Atropine gttS

- STILL NEED GLASSES
- Still potential for side effects, however slight

75

## Atropine gttS

NOTE:  
nonselective muscarinic acetylcholine receptor antagonist

blocks all muscarinic receptor subtypes: M<sub>1</sub> through M<sub>5</sub> receptors

76

## Atropine gttS

Historically atropine CAN be dangerous in high quantities...

Generally safe in use for ophthalmic purposes, but if too much is systemically ingested/absorbed...

77

Atropine systemic poisoning:

increased antimuscarinic side effects:

- hot as a hare warm.....dry skin from decreased sweating
- blind as a bat..... blurry vision,
- dry as a bone..... decreased tear production
- red as a beet..... vasodilation
- mad as a hatter.....delirium/CNS effects

78

Almost impossible in low concentrations  
 15ml bottles of 0.05% atropine

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3298216/>

79

Optical solutions?

Classes or Contacts???

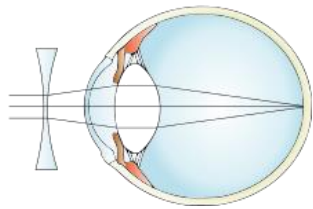
80

Peripheral defocus

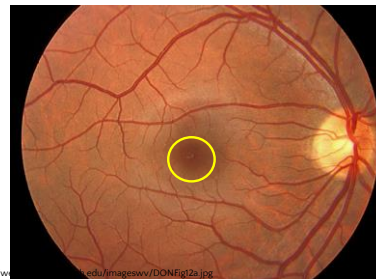
A HUGE FACTOR  
 In Myopia Development

And one WE can affect as ECPs

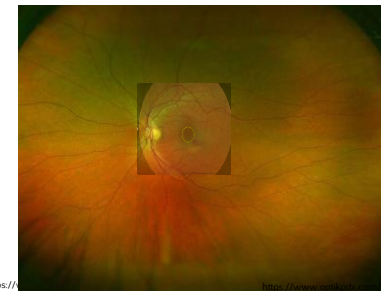
81



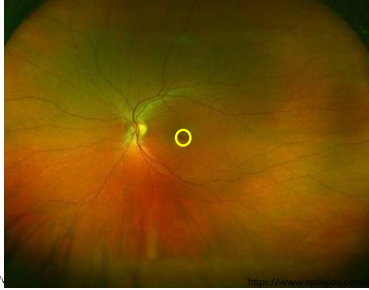
82



83



84



<https://www.retinatoday.com/2015/06/01/retinal-imaging/>

85

<https://vimeo.com/28658893>

86

We are so concerned about CENTRAL vision...the important part is the PERIPHERAL

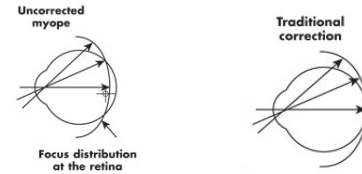
<https://www.eyedotryblog.com/2015/06/whats-happening-to-our-vision.html>

87

Show studies in animals that show induced peripheral defocus causes myopia

Eye "wants" peripheral light rays on or in front of the retina (myopic defocus)

- IF focused BEHIND RETINA in periphery instead.. (hyperopic defocus), then....
- Which axially lengthen bring those peripheral retinal images into focus....
- Which MEANS....MORE MYOPIA...
- So we correct with Traditional correction centrally....
- Which focuses BEHIND RETINA in periphery
- Which axially lengthens...
- Which Means more myopia
- Which focuses BEHIND RETINA in periphery....
  - AND ON AND ON CASCADE EFFECT

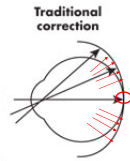


<https://reviewofmm.com/whats-up-with-myopia/>

88

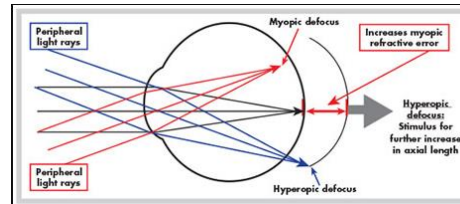
89

90



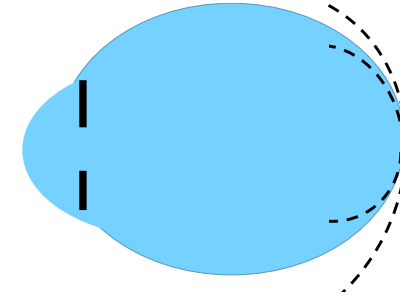
<https://reviewofmm.com/whats-up-with-myopia/>

91

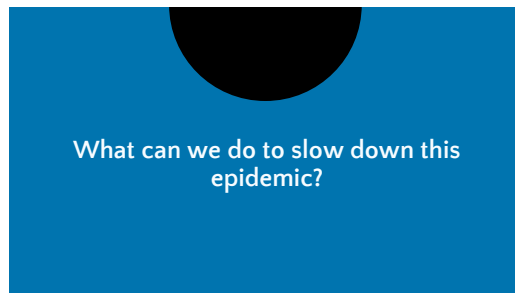


<https://www.eyedoctrayblog.com/2015/06/whats-happening-to-our-vision.html>

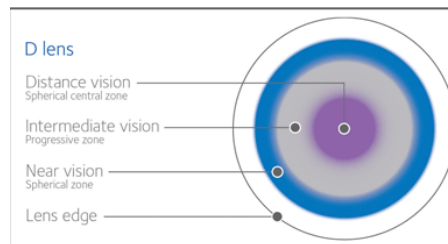
92



93



94



95

VERY IMPORTANT::  
 Was NOT FDA APPROVED when I started this course

NOW.....  
 NOV 2019, Coopervision MiSight

96



VERY IMPORTANT:  
 Other methods not FDA approved, would be "off-label"  
 For example, Atropine at .05% or .01% only from Compounding pharmacy  
 Ortho K very effective, but again, "OFF LABEL"

97



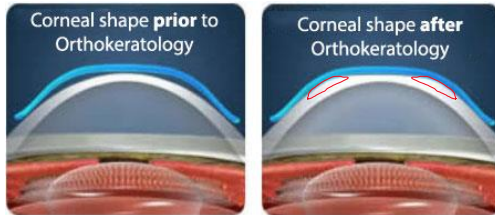
<http://www.gsopticians.com/ortho->

98



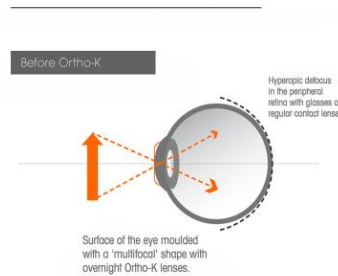
<https://contactsadvice.com/2017/03/are-ortho-k-contacts-for-you/>

99

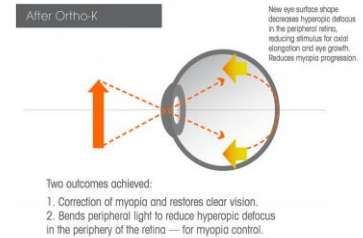


<https://contactsadvice.com/2017/03/are-ortho-k-contacts-for-you/>

100



101



102

Both Otho K & Distance Center CL  
 provide proper Peripheral Retinal Defocus to slow Myopia  
 Progression

103

Analysis

Glasses:

- Traditional SV lenses NOT the answer
- Bifocal/PALs?
- OR NEW technology?

104

SPECTACLE  
 CORRECTION

Multifocal lenses for Children

Exec?  
 PAL?

105

SPECTACLE  
 CORRECTION

Myopia Control SV lenses (peripheral defocus or accommodative lag lenses)

- Essilor Stellest (FDA 2021 "breakthrough device designation)
- Hoya MiyoSmart (not FDA, avail in other countries currently)
- Varilux Myopilux
- Zeiss Myovision Pro/ Myokids/Myocare

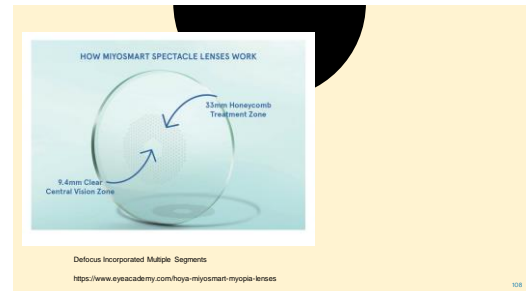
https://www.essilor.com/en/medias/press-releases/essilor-receives-breakthrough-device-designation-for-its-new-generation-of-spectacle-lens-technology-for-myopia-control

106



<https://evershineoptical.com.sg/2021/07/05/stellest-vs-miyosmart-comparison/>

107



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**DECEMBER 2022 Study in JAMA**  
 Studied efficacy in controlling myopia using spectacle lenses with:

- conventional single-vision spectacle lenses
- highly aspherical lenslets
- slightly aspherical lenslets

• HAL > in myopia control than SAL or SV

Bao J, Huang Y, Li X, et al. Spectacle lenses with aspherical lenslets for myopia control vs single-vision spectacle lenses. JAMA Ophthalmology. 2022;140(5):472-8.

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**ZEISS MyoVision® Pro**  
 Applying the principles of Peripheral Defocus Management

The central zone provides sharp and uncompromised distance vision.

The periphery of the lens has a specific design with the goal of reducing myopia progression\*.

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**Myopilux® Max**

Spectacle Lenses	
Company	Essilor
Product Name	Essilor Myopilux Max
Product Type	Progressive bifocal spectacle lens
Product Detail	Executive bifocal with +2.00 add and 5 base in prism in the near zone of each lens

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**ZEISS MyoKids®**  
 Applying the principles of Accommodative Lag Management

The top half of the lens supplies clear vision to the fovea\*.

The bottom active zone simultaneously supports near vision tasks and can help to reduce myopia progression\*.

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Analysis

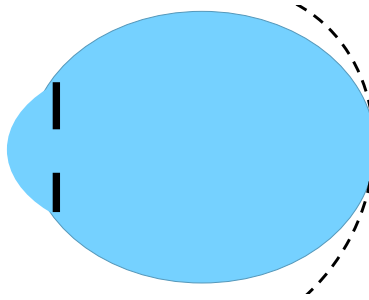
**Glasses:**

- Efficacy?
- Multifocals and children?
- Sports?
- Cosmesis? (exec?)

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NOTE ON UNDERMINING.

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question....

Can you combine treatments..

We're looking into it! More research EVERY MONTH...

STAY CURRENT!

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- Higher level of myopia at earlier age = worse final expected Rx
- Earlier treatment = Better results

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- IT is critical to understand that the study of Myopia AND Myopia control is constantly evolving
- More research every year...

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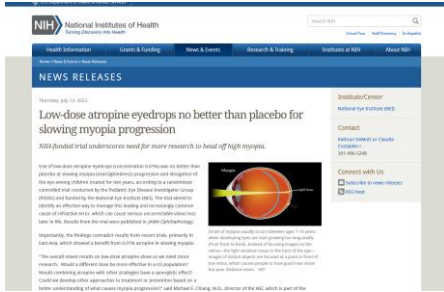
Studies have shown that OUTDOOR EXPOSURE TO SUNLIGHT lowers risk for Dx of Myopia

However.....

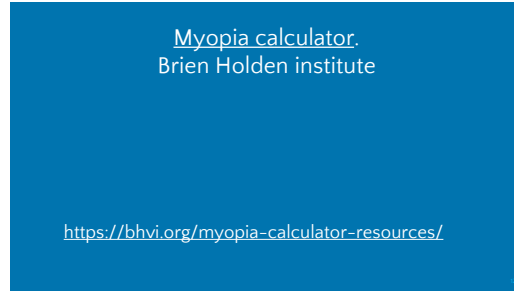
Once the process begins, DOES NOT slow progression!?!?!?

Or does it....some changes in literature...

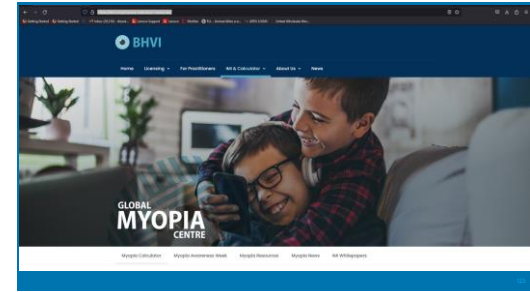
120



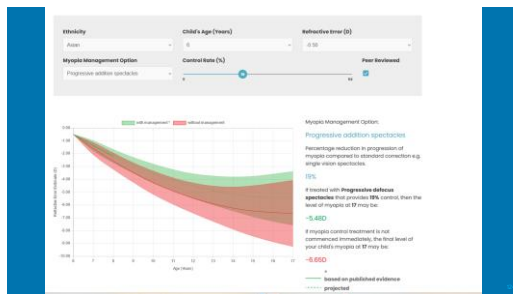
121



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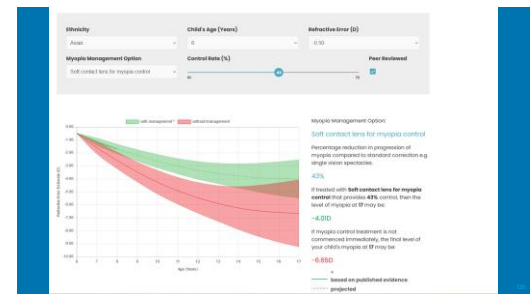
123



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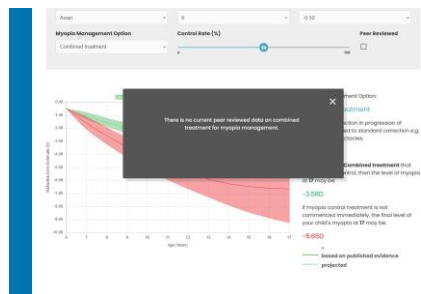
127



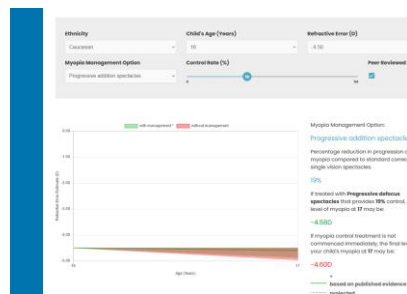
128



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VERY IMPORTANT::

NO INSURANCE, SELF PAY

Generally patients educated by providers/practitioners, no major corporate backing/marketing..

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Take home:

- Myopia is a worsening problem
  - environmental, genetic, hereditary
- Myopia leads to increase pathology
- Myopia can (and should be) treated to minimize
  - Not reverse or halt (yet)

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Take home:

Consider revisiting our standard of care

- In next 10 years, myopia control strategies likely will be FAR more common
- OPTICIANS/DISPENSERS should be involved and at the table in this endeavor

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