MYOPIA CONTROL

Why are we here?

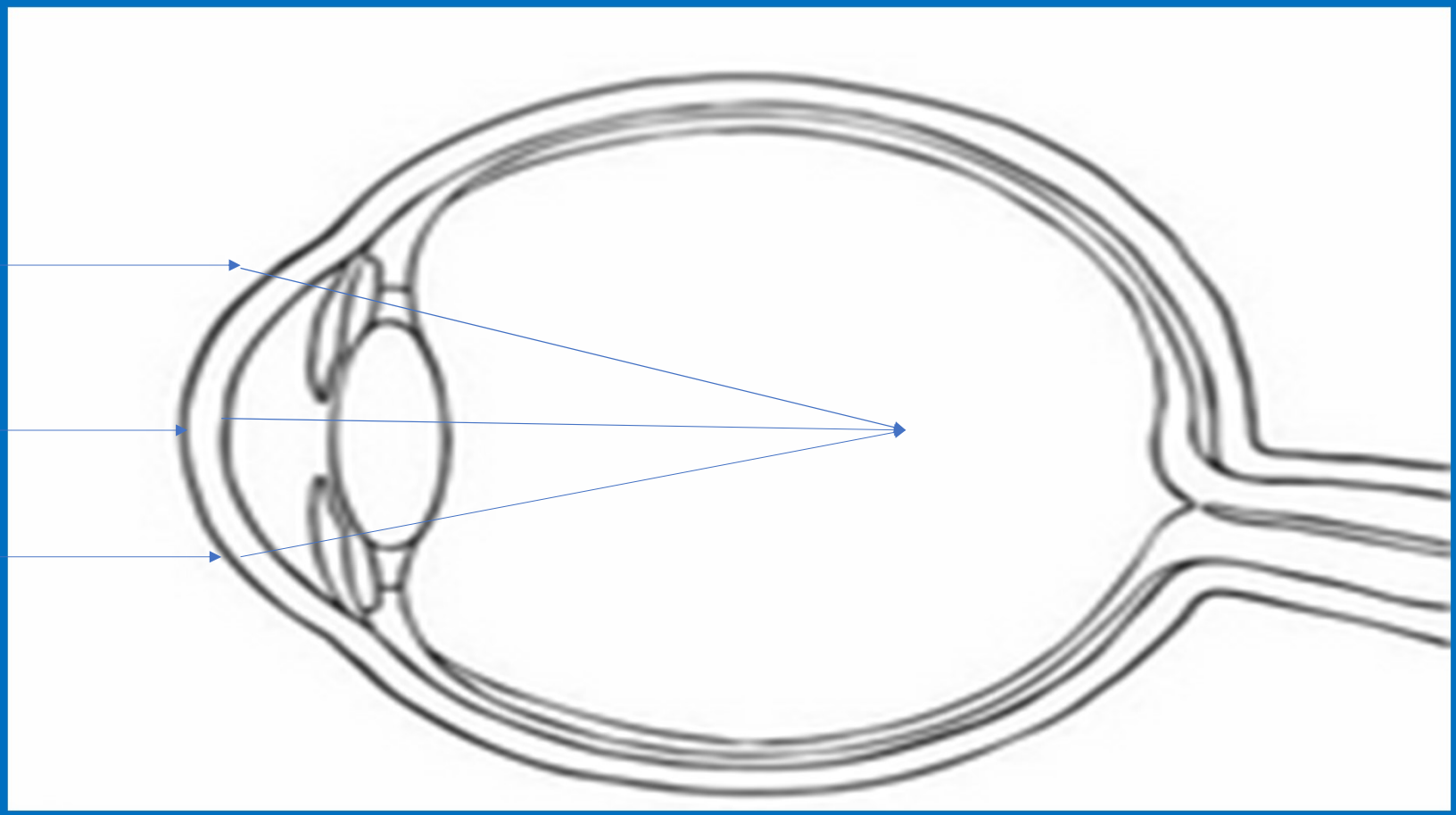
What is Myopia?

Is it getting worse?

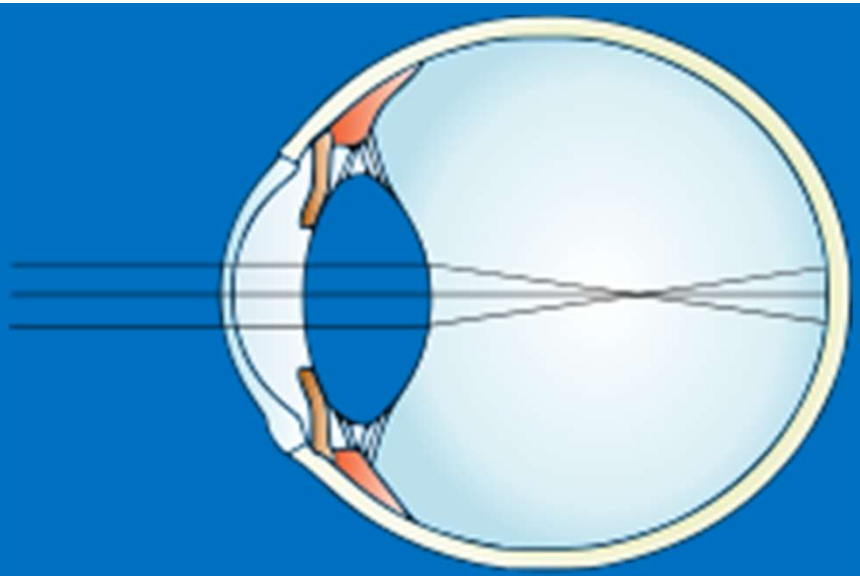
Does worsening Myopia lead to higher likelihood of other problems?

Is there anything we can do to help the issue?

What barriers to Eye Care Providers face to tackling this issue..



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



://en.wikipedia.org/wiki/Near-sightedness

- Development of young eye

Patients, on average, don’t START myopic

- Development of young eye

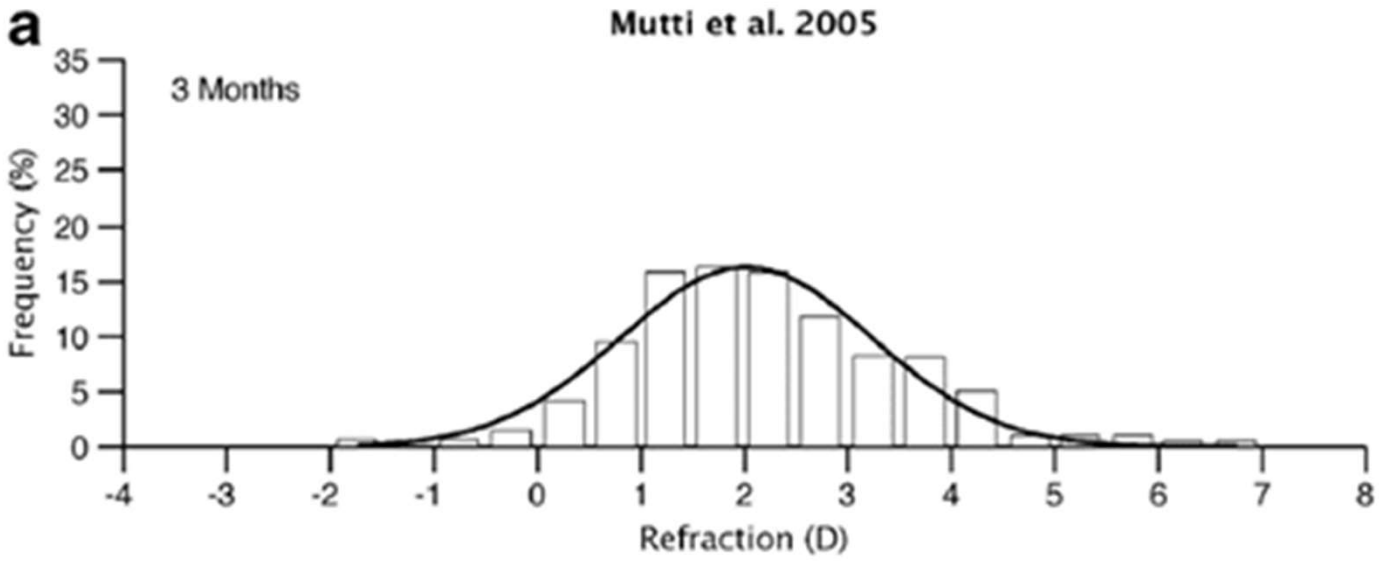
Generally the average infant is born hyperopic.

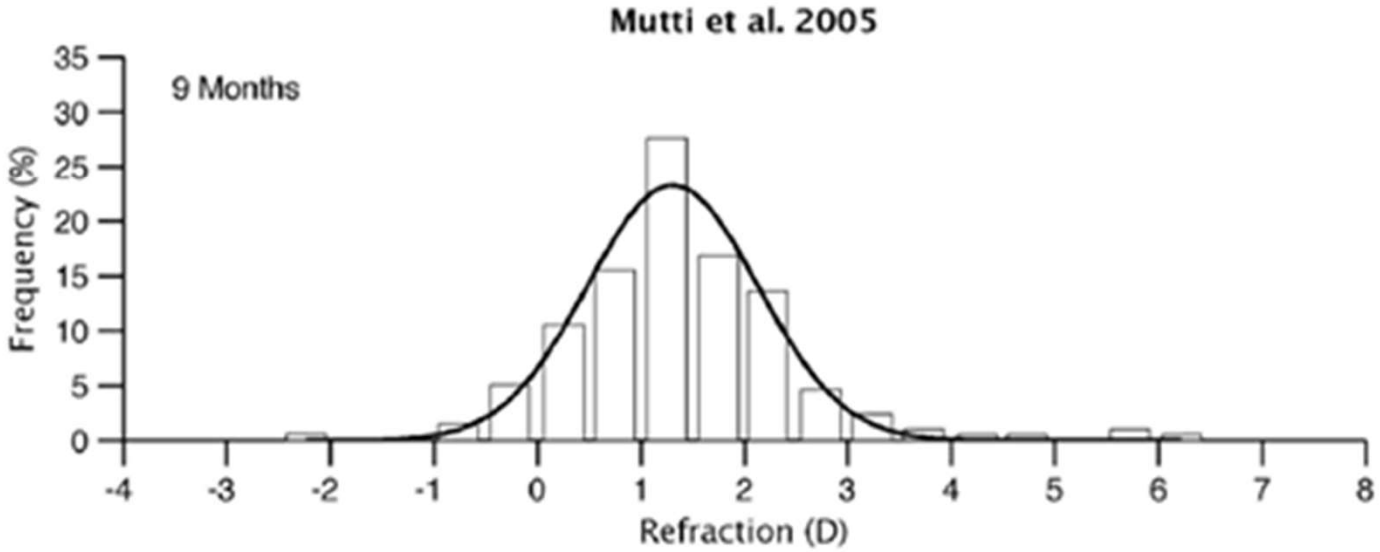
From 6-9months, the amount of hyperopia is reduced

Emmetropization

- Development of young eye

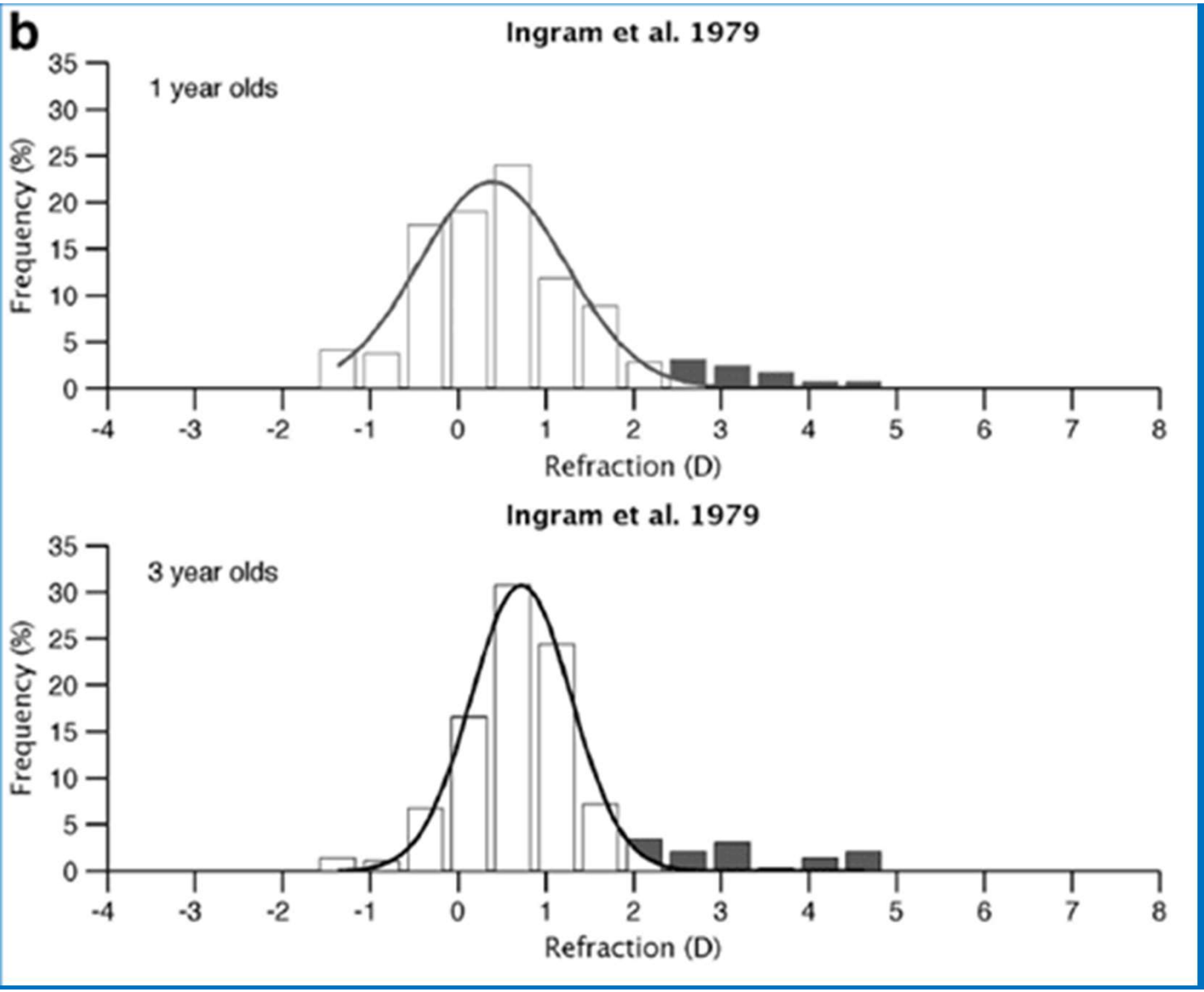
From that





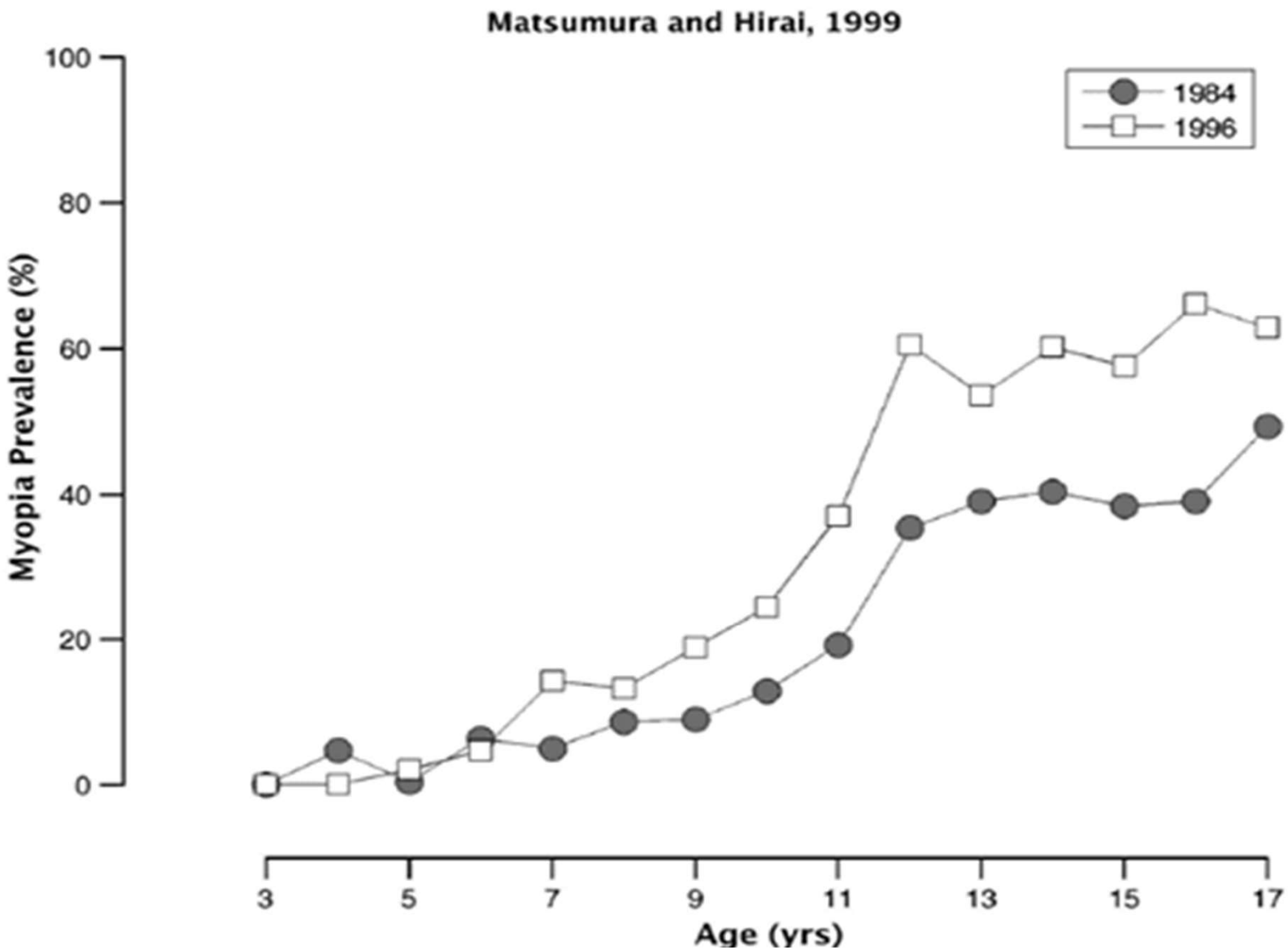
3 monts old avg = approx. 2.00 D hyperopia (with wide range)

9 monts old avg = approx. 1.25 D hyperopia (with narrowing range)



Both in the +0.50 Range in 1-3 y/o, (but narrower bell curve)

- It’s now in adolescence that we start to see myopia develop historically.


Matsumura and Hirai, 1999
1984
1996
Myopia Prevalence (%)
100
80
60
40
20
0
3
5
7
9
11
13
15
17
Age (yrs)

- 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

- 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"

- BIG DEAL???

JUST WEAR GLASSES

Or Contacts ☺

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

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….

myopia as a minor issue to be corrected

VS.

now a serious health issue with potentially serious long term complications

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 -5.75	**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://newgradoptometry.com/myopia-control/

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

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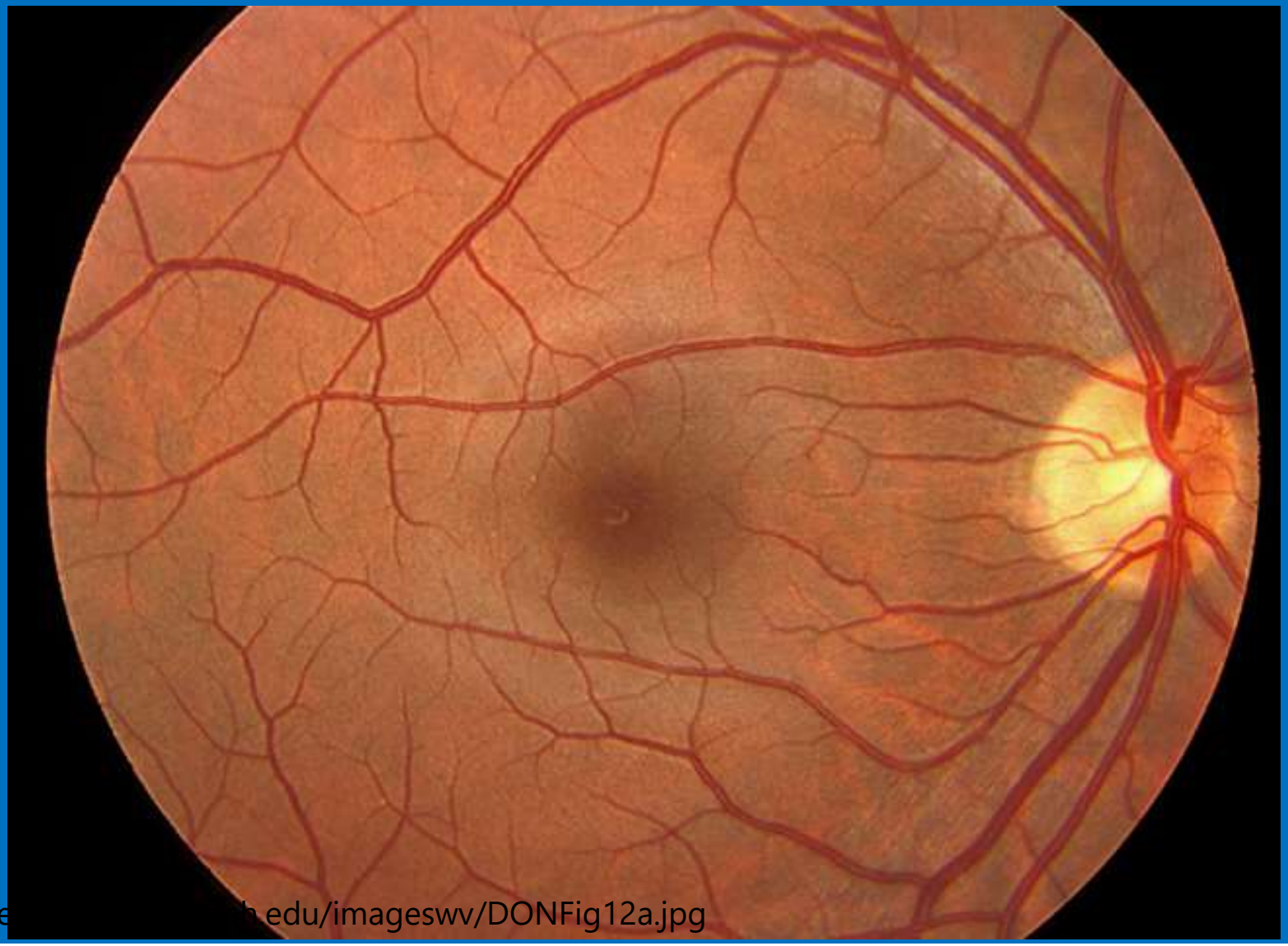
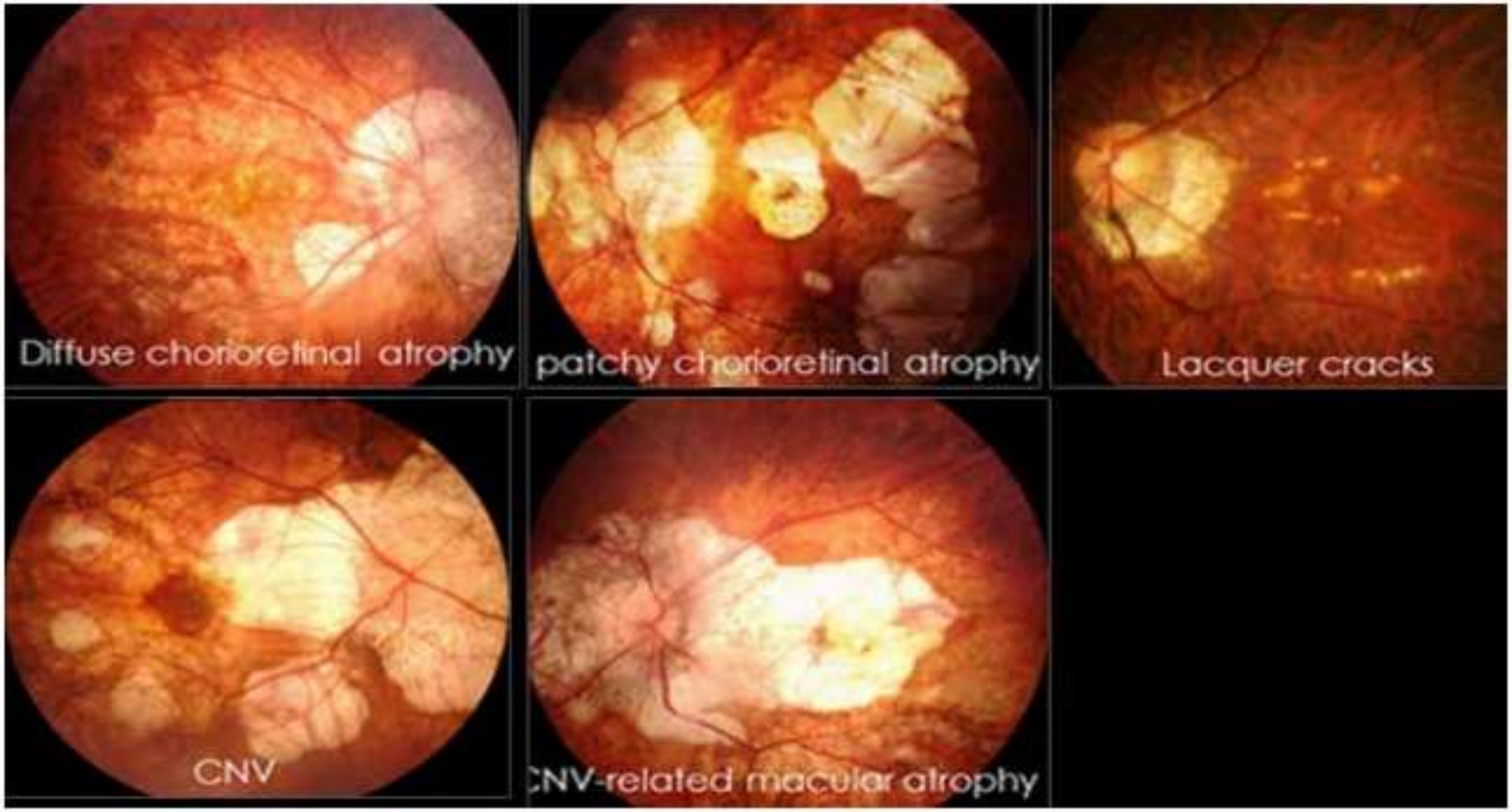


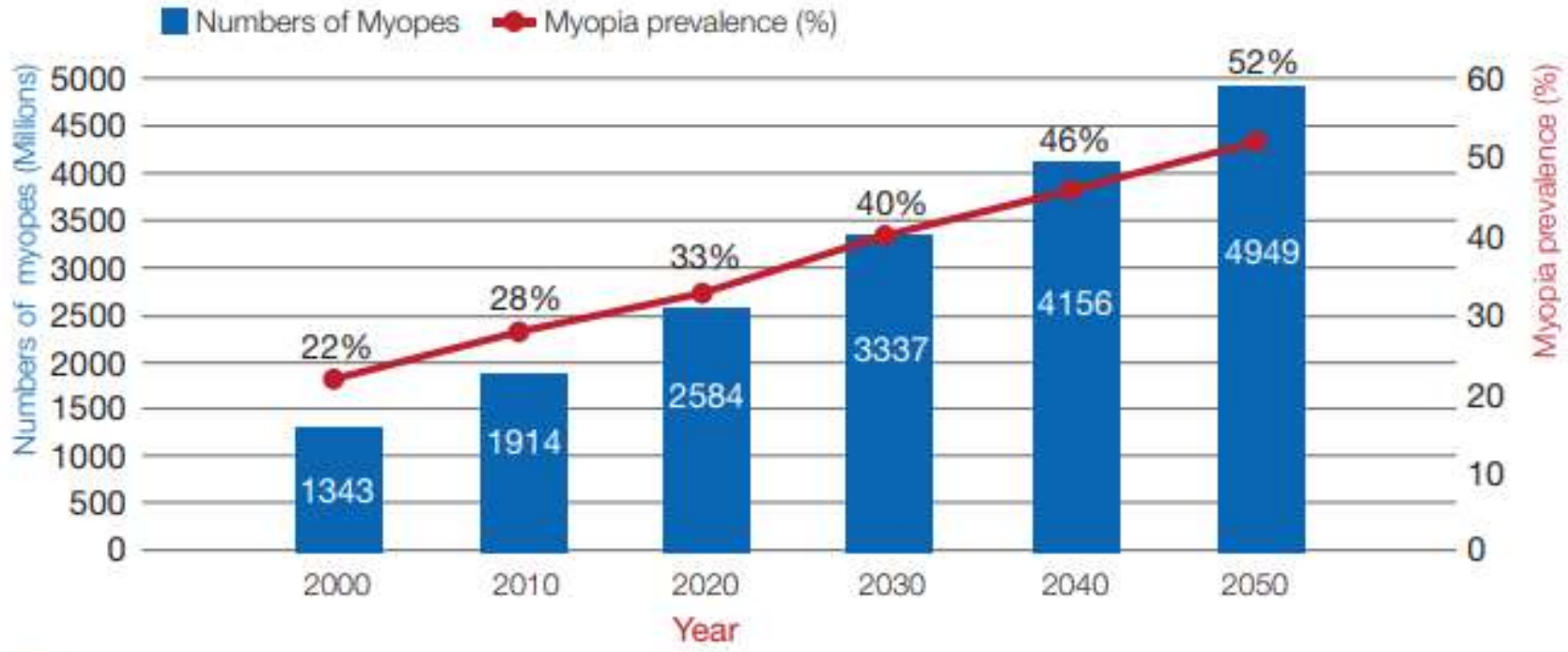
https://we edu/imageswv/DONFig12a.jpg

Fig. 3. Myopic macular degeneration



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

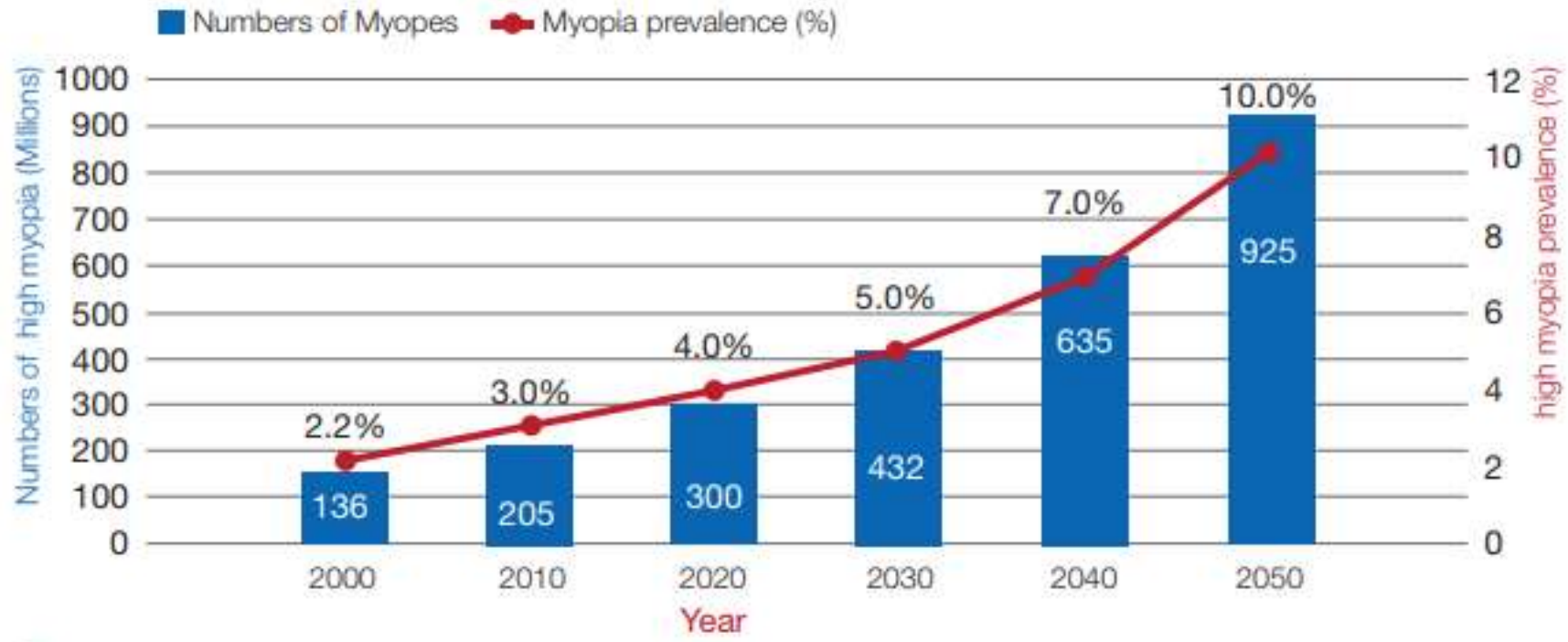
Results: Myopia - Now and in 2050



BrienHoldenVisonInstitute

Adapted from Holden et al. 2016 Ophthalmology

Results: High Myopia - Now and in 2050



BrienHoldenVisonInstitute

Adapted from Holden et al. 2016 Ophthalmology

Americans

Myopia prevalence

2015 = 42%

1971 = 25%

East Asians = 70% by 15 years old

23% over last decade..

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://bjo.bmj.com/content/100/7/882

https://www.topuniversities.com/student-info/studying-abroad/how-get-australian-student-visa

Almost

5 billion

myopes by 2050

- WHY?

We've established it's happening..

What is Causing it?

Heredity

Genetics

Environmental factors

Near Work

Others?

Peripheral Retinal Defocus

Heredity

Mom and Pops…

Genetics…

Previously though 20-40 genetic factors for myopia

2018 study found 161 genetic factors

Cream Study (consortium for refractive error and myopia)

Genetics…

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

ENVIRONMENTAL

Time Spent Outdoors = Lower risk of becoming myopic

Prescribe your pediatric pts outdoor activity

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

- Children in urban environ 2.6x more likely than rural

Does sunlight :

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

http://www.dallasfirstumc.org/home/clc/cute-sun-with-sunglasses-clipart-ytkg5regc/

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

He 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. Sep 15;314(11):1142–8. Wu PC, 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.

Counterintuitive’

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

However…..

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

Near Work and myopia

One study showed potential for:

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

GENETICS

Near work

Sunlight

Ethnicity

Other…

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.pointsdevue.com/article/myopia-and-effective-management-solutions

GENETICS

Near work

Sunlight

Ethnicity

Other…

GENETICS

Near work

Sunlight

Ethnicity

Other…

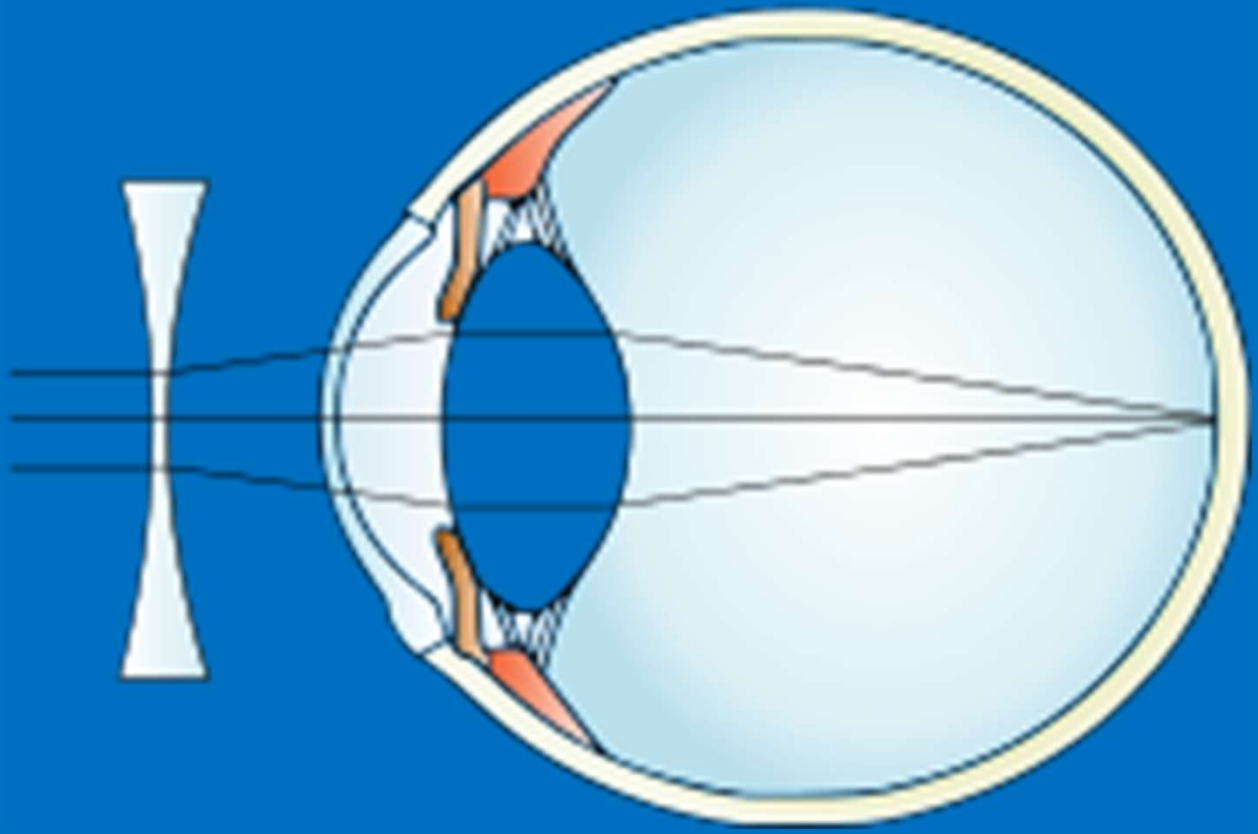
Children of East Asian ethnicity have a faster myopic progression rate and demonstrate more robust outcomes with interventions aimed at slowing the progression of the condition.

https://www.aoa.org/AOA/Documents/Advocacy/HPI/Doctors%20of%20Optometry%20in%20the%20Management%20of%20Myopia%20and%20Prevention%20of%20Related%20Eye%20Disease.pdf

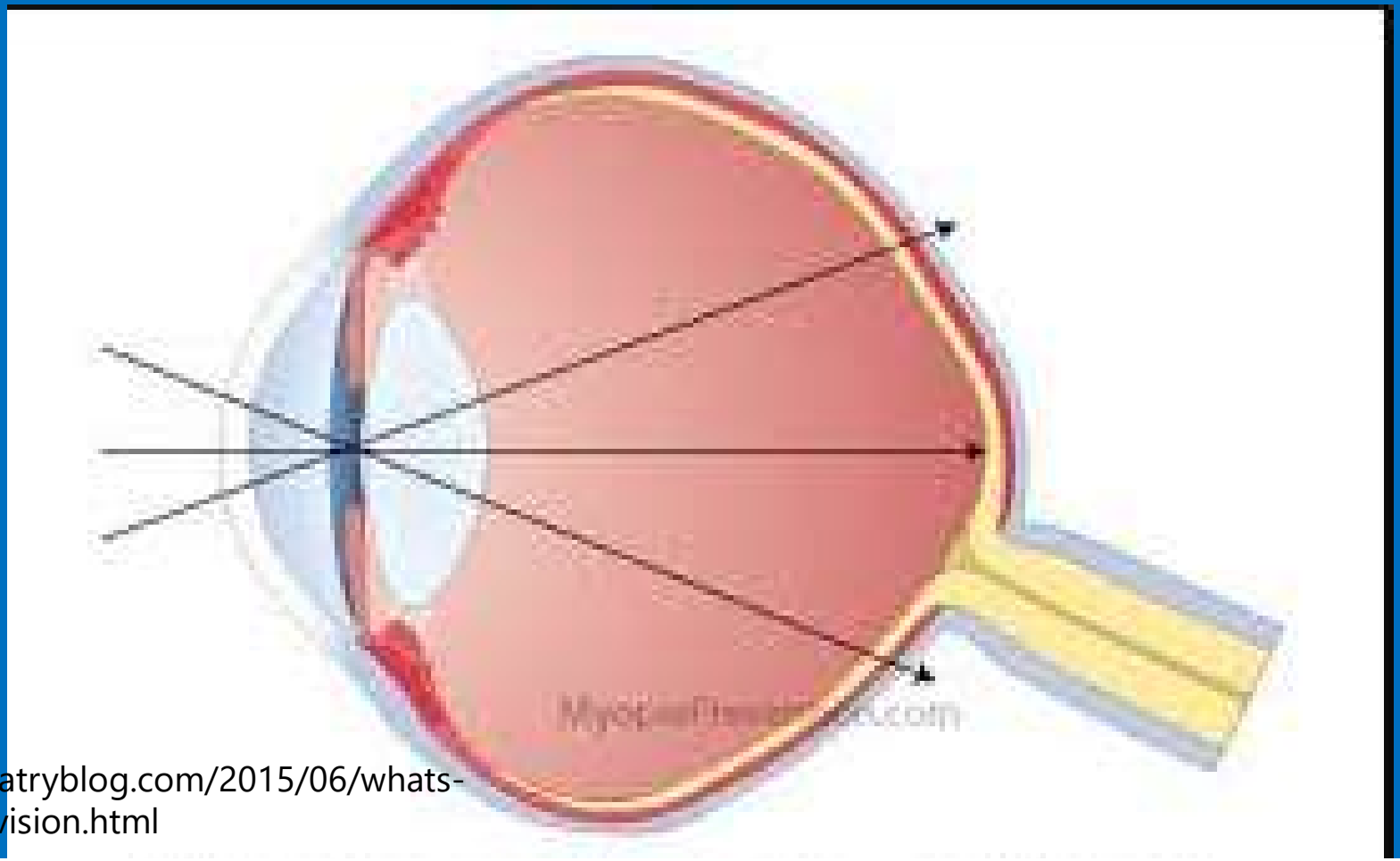
Peripheral defocus

A HUGE FACTOR
In Myopia Development

And one WE can affect as ECPs

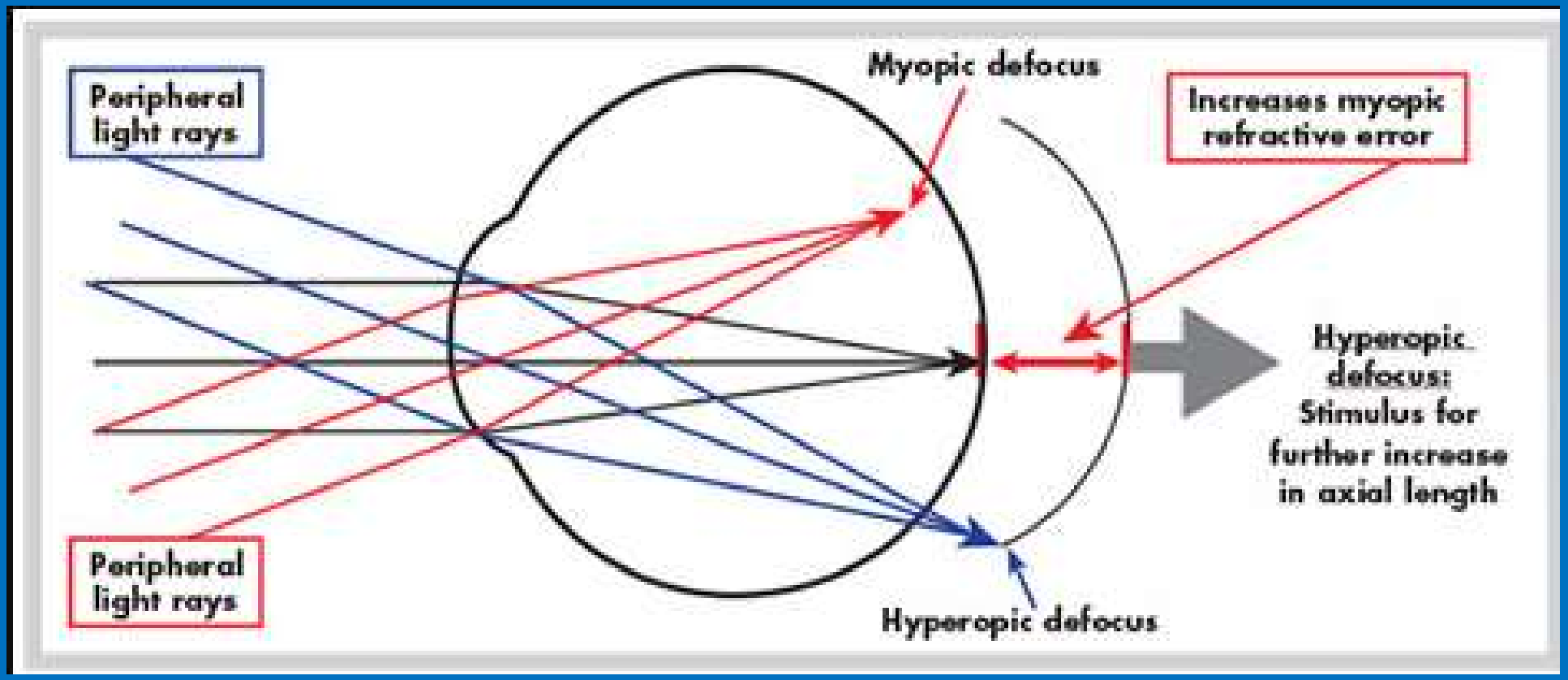


We are so concerned about CENTRAL vision…the important part is the PERIPHERAL

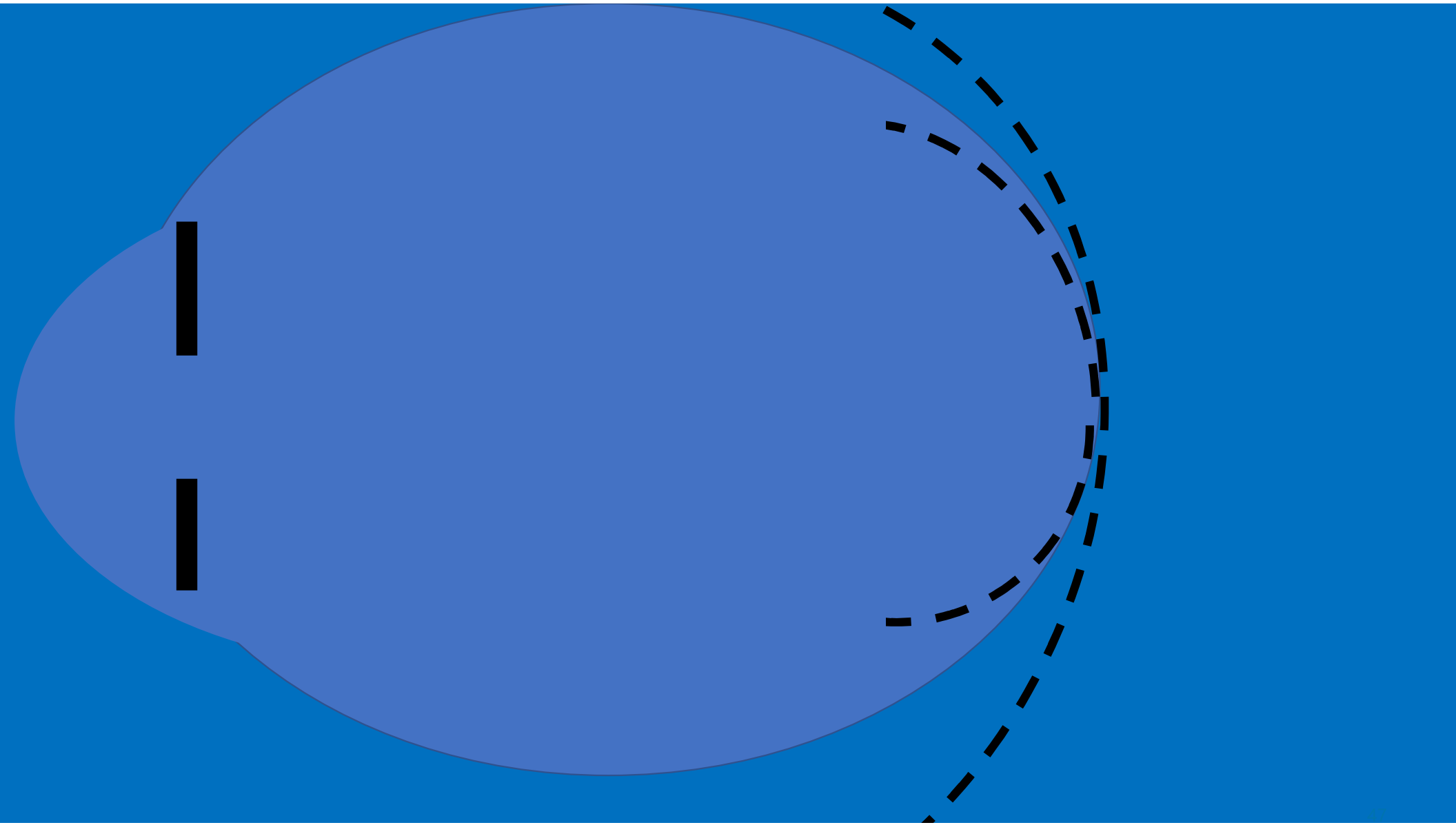


https://www.eyedolatryblog.com/2015/06/whats-happening-to-our-vision.html

Show studies in animals that show induced peripheral defocus causes myopia

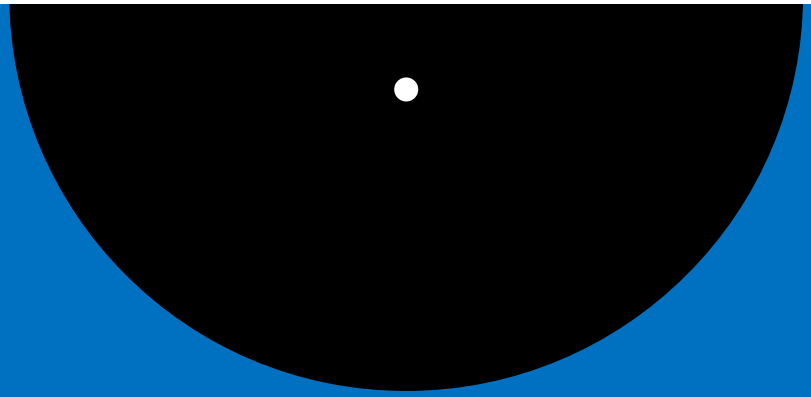


https://www.eyedolatryblog.com/2015/06/whats-happening-to-our-vision.html



Facebook post about Myopia Control TedTalk

IT IS MULTIFACTORIAL



What can we do to slow down this epidemic?

What can we do?

•1

- Do Nothing?

- Give regular distance Rx in specs or CL
- BAD IDEA

•2

- Opthalmic Lenses

- PAL vs Execs
- SV peripheral defocus lenses

•3

- ORTHO K

- Overnight reshaping Contact Lenses
- Invisaligns for your corneas

•4

- Mutifocal CL

- Specifically DISTANCE CENTER Multifocal Contacts

•5

- Atropine Drops

- Yes, Dilating drops…just diluted

Reference : The basics you can find anywhere 5 Steps To Successful Storytelling Published on April 5, 2014 Featured in: Marketing & Advertising

SPECTACLE CORRECTION

Multifocal lenses for Children

Exec?

PAL?

SPECTACLE CORRECTION

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

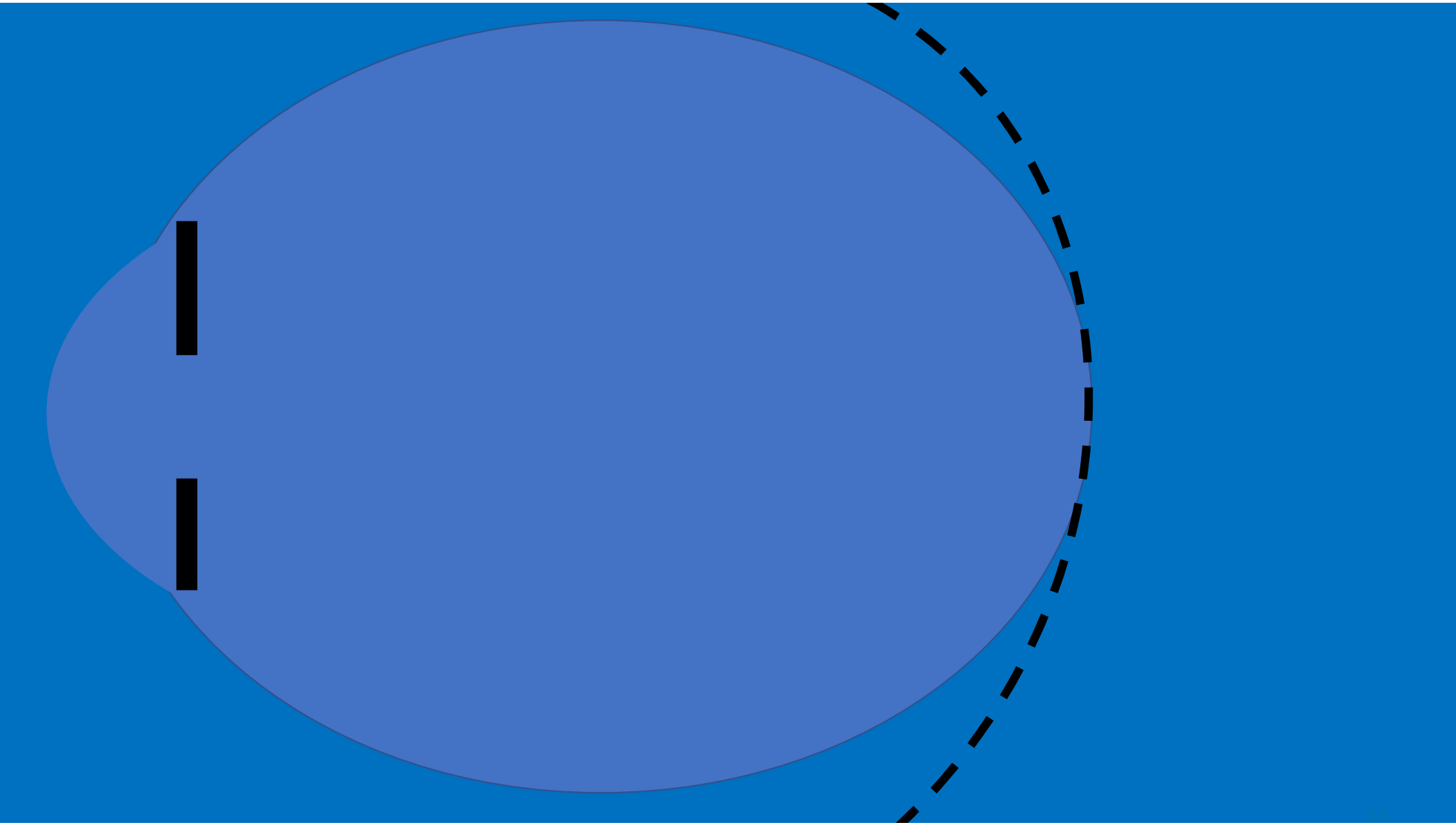
- Essilor Stellest (FDA 2021 “breakthrough device designation)
- Hoya MiyoSmart (not FDA, avail in other countries currently)

- Varilux Myopilux

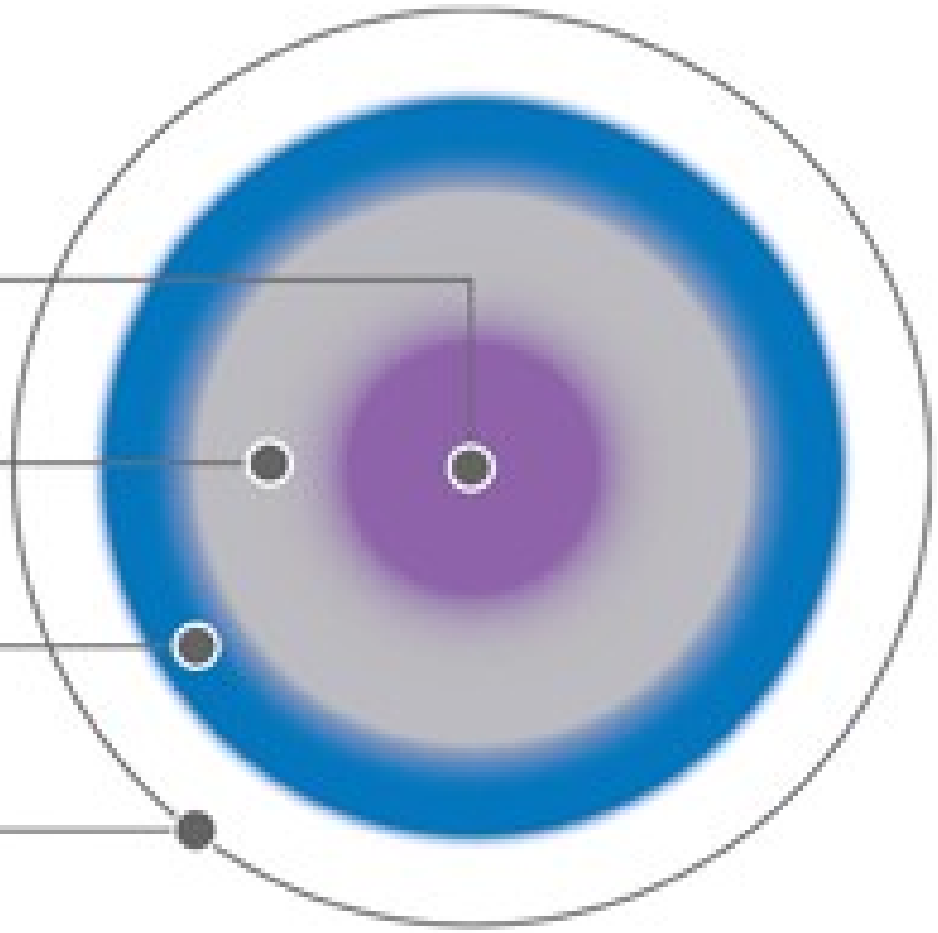
- Zeiss Myovision Pro/ Myokids

https://www.essilor.com/en/medias/press-releases/essilor-receives-fda-breakthrough-device-designation-for-essilor-stellest-its-new-generation-of-spectacle-lens-solutions-in-the-fight-against-myopia/

NOTE ON UNDERMINUSING…



D lens

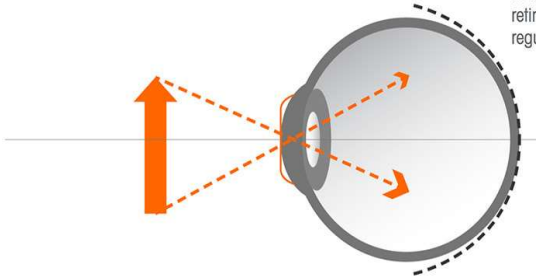

Distance vision
Spherical central zone
Intermediate vision
Progressive zone
Near vision
Spherical zone
Lens edge

http://www.gpspecialists.com/ortho-k/

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

ORTHOKERATOLOGY (ORTHO-K)

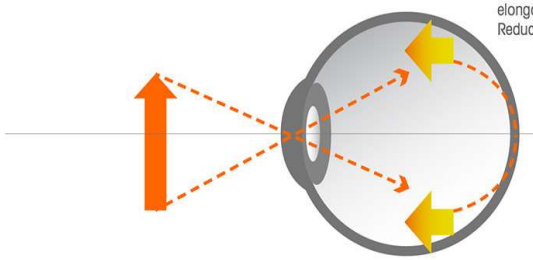
Before Ortho-K



Hyperopic defocus in the peripheral retina with glasses or regular contact lenses.

Surface of the eye moulded with a 'multifocal' shape with overnight Ortho-K lenses.

After Ortho-K



New eye surface shape decreases hyperopic defocus in the peripheral retina, reducing stimulus for axial elongation and eye growth. Reduces myopia progression.

Two outcomes achieved:

1. Correction of myopia and restores clear vision.
2. Bends peripheral light to reduce hyperopic defocus in the periphery of the retina — for myopia control.

Both Otho K & Distance Center CL

provide proper Peripheral Retinal Defocus to slow Myopia Progression

Pharmacological

÷ 100

0.01% (or 0.05%)

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-5f93-4d06-aac1-889cecb15fb2/635835505202800000/atropine-for-myopia-5-yr-clinical-trial-ophthalmology-2015-pdf?inline=1

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-5f93-4d06-aac1-889cecb15fb2/635835505202800000/atropine-for-myopia-5-yr-clinical-trial-ophthalmology-2015-pdf?inline=1

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

2019

NOW **0.05 %** showed better efficacy than 0.01%

https://www.aaojournal.org/article/S0161-6420(19)32356-5/fulltext

Low dose ATROPINE

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

Seems to be ↑ in dopamine

- 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/

Myopia calculator.

Brien Holden institute

- Higher level of myopia at earlier age = worse final expected Rx

- Earlier treatment = Better results

VERY IMPORTANT::

Was NOT FDA APPROVED when I started this course

NOW…..:

NOV 2019, Coopervision MiSight

VERY IMPORTANT::

Other methods not FDA approved, would be “off-label”

For example, Atropine at .05% or .01% only from Compounding pharmacy

VERY IMPORTANT::

NO INSURANCE, SELF PAY

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

Atropine gtts

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

Atropine gtts

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

Atropine sytemic 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

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

Analysis

Glasses:

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

Analysis:
MF CL and Ortho K

- Good Efficacy
- Corrects vision AND slows Progression
- Minimal impact on daily activities, low side effects
-

question….

Can you combine treatments..

We’re looking into it! More research EVERY MONTH…

STAY CURRENT!

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)

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