

# Myopia-Progression-Control

## Update 2019

Dr. Michael Bärtschi

Ph.D. in Biomedicine (ARVO)

M.Sc.Optom. et M.med.Education (FAAO)

[mbaertschi@eyeness.ch](mailto:mbaertschi@eyeness.ch)

Swiss Academy  
of Ophthalmology



Luzern, 7. March 2019

# Disclosure

No commercial or financial interest  
in any product named in this lecture.



## Paid Consultant for:

*ALCON Vision Care*

*COOPER Vision*

*GALIFA Contactlinsen*

*SENSIMED SA*

*APPENZELLER Kontaktlinsen*

*FALCO Contactlinsen*

*GELFLEX Laboratories*

*TECHCOLORS/Adventures in Colors*

*BOSTON Polymer Technology*

*Haag-Streit AG*

*JOHNSON & JOHNSON Vision Care*

*TISSOT Medical Research*

# Myopia-Management I

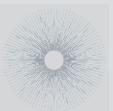
Atropine, Contact lenses,

~~Outdoors & Digital Devices~~

Dr. Michael Bärtschi

Ph.D. in Biomedicine, FAAO/ARVO  
M.Sc.Optom. et M.med.Education  
mbaertschi@eyeness.ch

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# DOWNLOAD

The screenshot shows the eyeness website's DOWNLOADS page. The header includes the logo "kontaktlinsenstudio bärtschi", navigation links for PORTRAIT, DIENSTLEISTUNGEN, PRODUKTE, NEWS, KONTAKT, K2 - THE DOUBLE, and social media links for Facebook, D, and E. The main content area has a background image of sand dunes. On the left, there's a sidebar with the text "NEUES ENTDECKEN". The central content area has a title "DOWNLOADS" and two paragraphs of text. Below that is a search bar and a table of download links. At the bottom, there's contact information and a navigation bar with links for NOTFÄLLE and DOWNLOADS.

SOCIAL MEDIA  
EVENTS UND MEDIEN  
**DOWNLOADS**  
OFFENE STELLEN

**DOWNLOADS**

Wellness für Ihre Augen - unser Leitgedanke. Wir geben Interviews, schreiben (Fach)Artikel oder stellen unsere Vision und Forschungsergebnisse an Vorträgen vor. Wir können nicht schweigen!

Hier haben wir für Sie alles zusammengestellt was sich so ansammelt an Vorträgen, Publikationen, Radiointerviews und Zeitungsbeiträgen.

Suchen nach	Autor	...	Suchen
<a href="#">PDF Weitsicht in Extremis, "die Kontaktlinse"</a>	1.51 MB	20.12.2018	
<a href="#">PDF OCT und Fundus Workshop, Medicollect Academy</a>	5.33 MB	15.10.2018	
<a href="#">PDF Optometrie im Alltag - Tag der Optometrie, München</a>	3.03 MB	14.10.2018	
<a href="#">PDF Use of therapeutic contact lenses in Epidermolysis Bullosa Dystrophica, DEBRA Congress</a>	1.75 MB	09.09.2018	
<a href="#">PDF Orthokeratologie und Presbyopie - Artikel "die kontaktlinse"</a>	109.45 KB	15.08.2018	
<a href="#">PDF much more than perfect vision - M.Sc. Kurs Benediktbeuren DE</a>	3.58 MB	09.06.2018	
<a href="#">PDF Weiche torische Kontaktlinsen bei Astigmatismus - ein Fallbericht / die kontaktlinse</a>	4.75 MB	22.05.2018	
<a href="#">PDF Tannihue Hydros-PFG Lenses Club</a>	1.42 MB	12.03.2018	

eyeness ag, Hirschengraben 11, CH-3011 Bern, Telefon +41 (31) 311 07 66, info@eyeness.ch

NOTFÄLLE    **DOWNLOADS**

**www.eyeness.ch**

## Voting:

Are you practicing myopia management ?

- A. I do regularly
- B. Rare or very rare
- C. I don't
- D. What is myopia management ?

# Myopia-Management

- Kontrollierte Anwendung präventiver Massnahmen zur nachhaltigen Hemmung des Längenwachstums des Auges zwecks Minimierung krankhafter Folgeschäden.



# Global Epidemiology

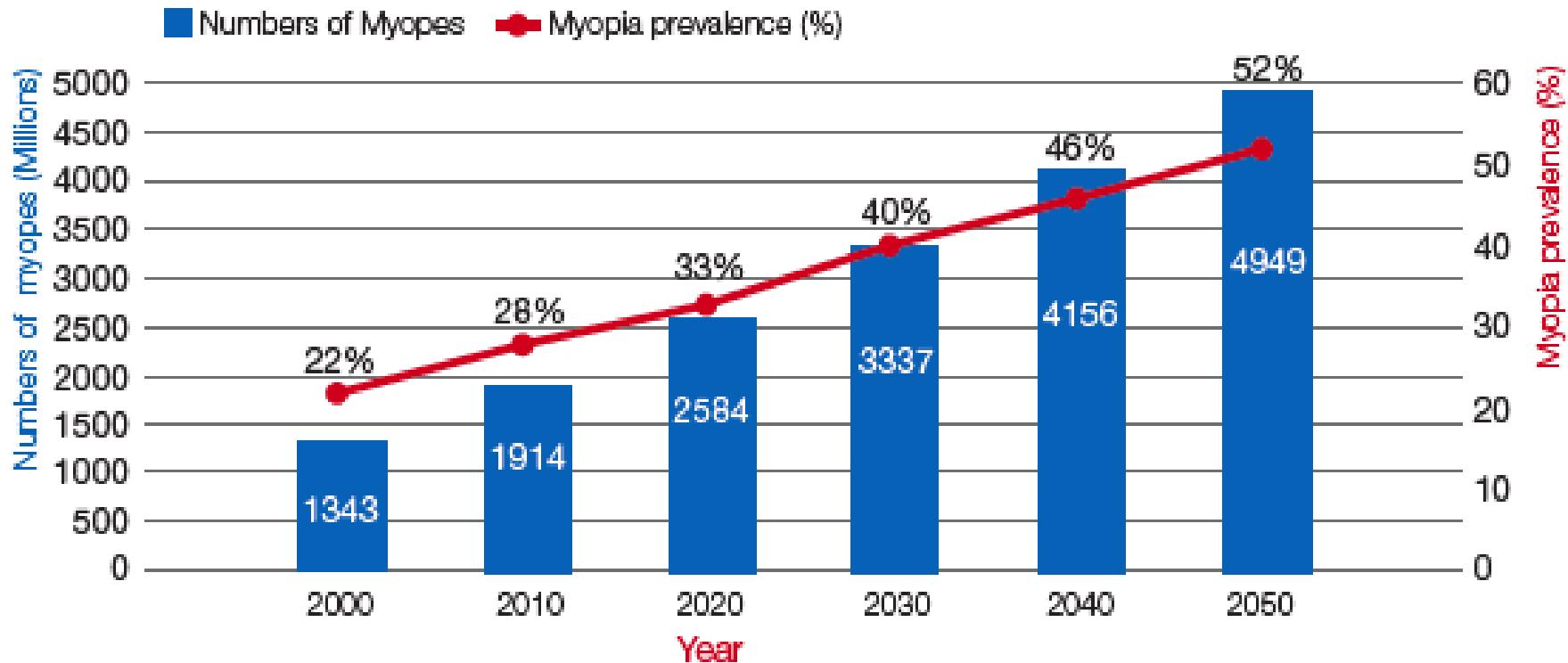
## THE IMPACT OF MYOPIA AND HIGH MYOPIA

Report of the Joint  
World Health Organization-Brien Holden Vision Institute  
Global Scientific Meeting on Myopia

University of New South Wales, Sydney, Australia  
16-18 March 2015



### Results: Myopia - Now and in 2050



# Clinical Evidence



Eye & Contact Lens • Volume 44, Number 4, July 2018

OPEN

REVIEW ARTICLE

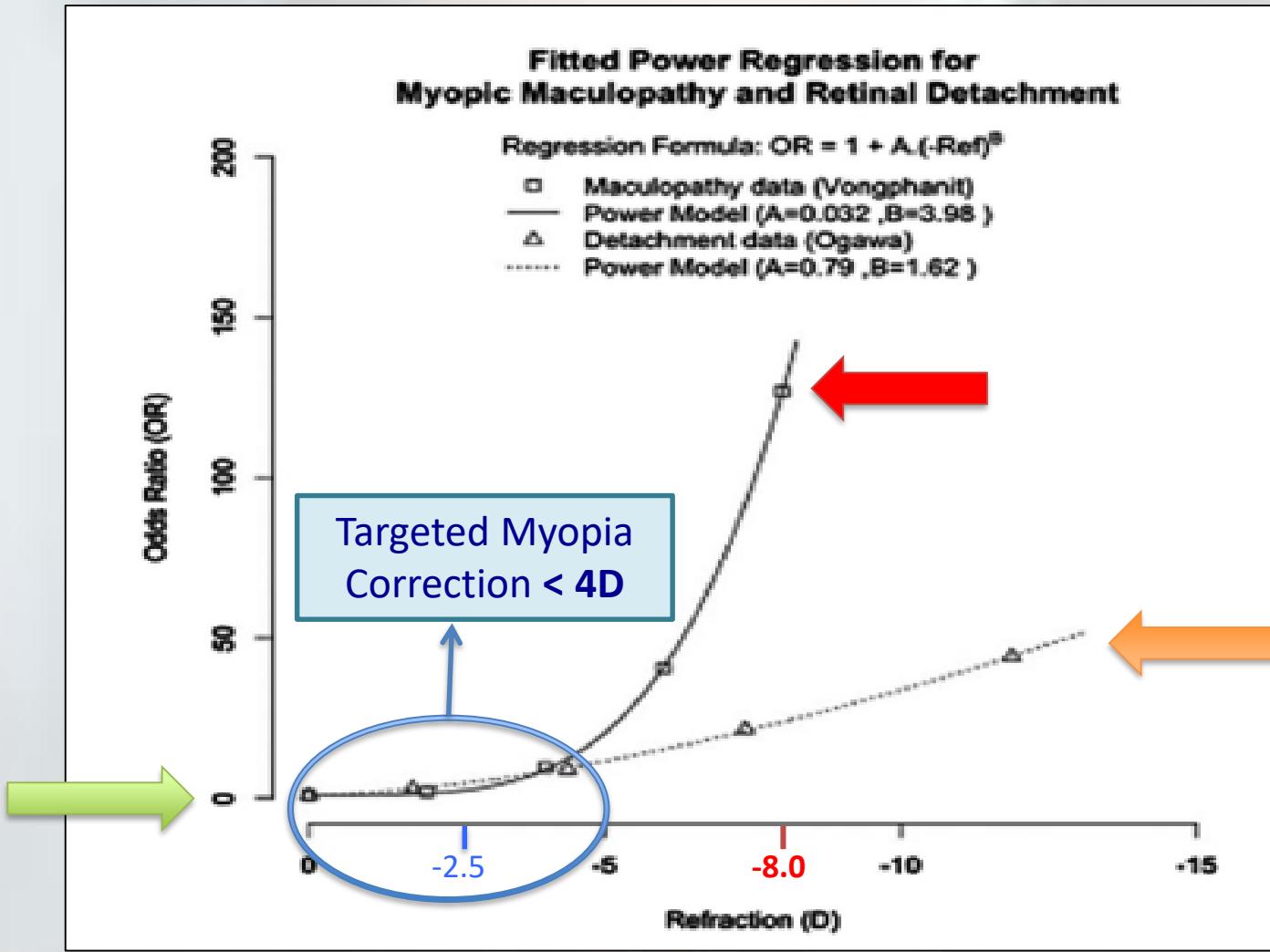
## A Review of Current Concepts of the Etiology and Treatment of Myopia

Jeffrey Cooper, M.S., O.D., F.A.A.O. and Andrei V. Tkatchenko, M.D., Ph.D.

- Myopic Macular Degeneration
- Ablatio Retinae
- Cataract
- Glaucoma



# Risk (Odds) Ratio





## Myopia Prevention and Outdoor Light Intensity in a School-Based Cluster Randomized Trial

Vol. 125/8, p.1239-50, August 2018

Pei-Chang Wu, MD, PhD,<sup>1</sup> Chueh-Tan Chen, MS,<sup>1</sup> Ken-Kuo Lin, MD,<sup>2</sup> Chi-Chin Sun, MD, PhD,<sup>3</sup> Chien-Neng Kuo, MD,<sup>4</sup> Hsiu-Mei Huang, MD,<sup>1</sup> Yi-Chieh Poon, MD,<sup>1</sup> Meng-Ling Yang, MD,<sup>2</sup> Chau-Yin Chen, MD,<sup>4</sup> Jou-Chen Huang, MD,<sup>4</sup> Pei-Chen Wu, MD,<sup>4</sup> I-Hui Yang, MD,<sup>7</sup> Hun-Ju Yu, MD,<sup>1</sup> Po-Chiung Fang, MD,<sup>1</sup> Chia-Ling Tsai, DDS,<sup>5</sup> Shu-Ti Chiou, PhD,<sup>6,7,8,\*</sup> Yi-Hsin Yang, PhD<sup>9,\*</sup>

„Currently, myopia maculopathy is the leading cause of blindness in Taiwan, Japan and China.“

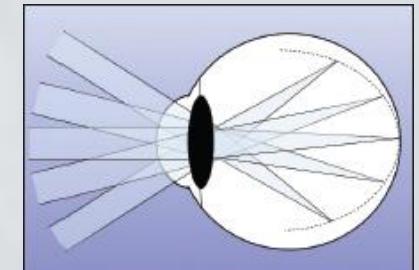
*Ophthalmology, 2018*

# Causality

## Multifactorial

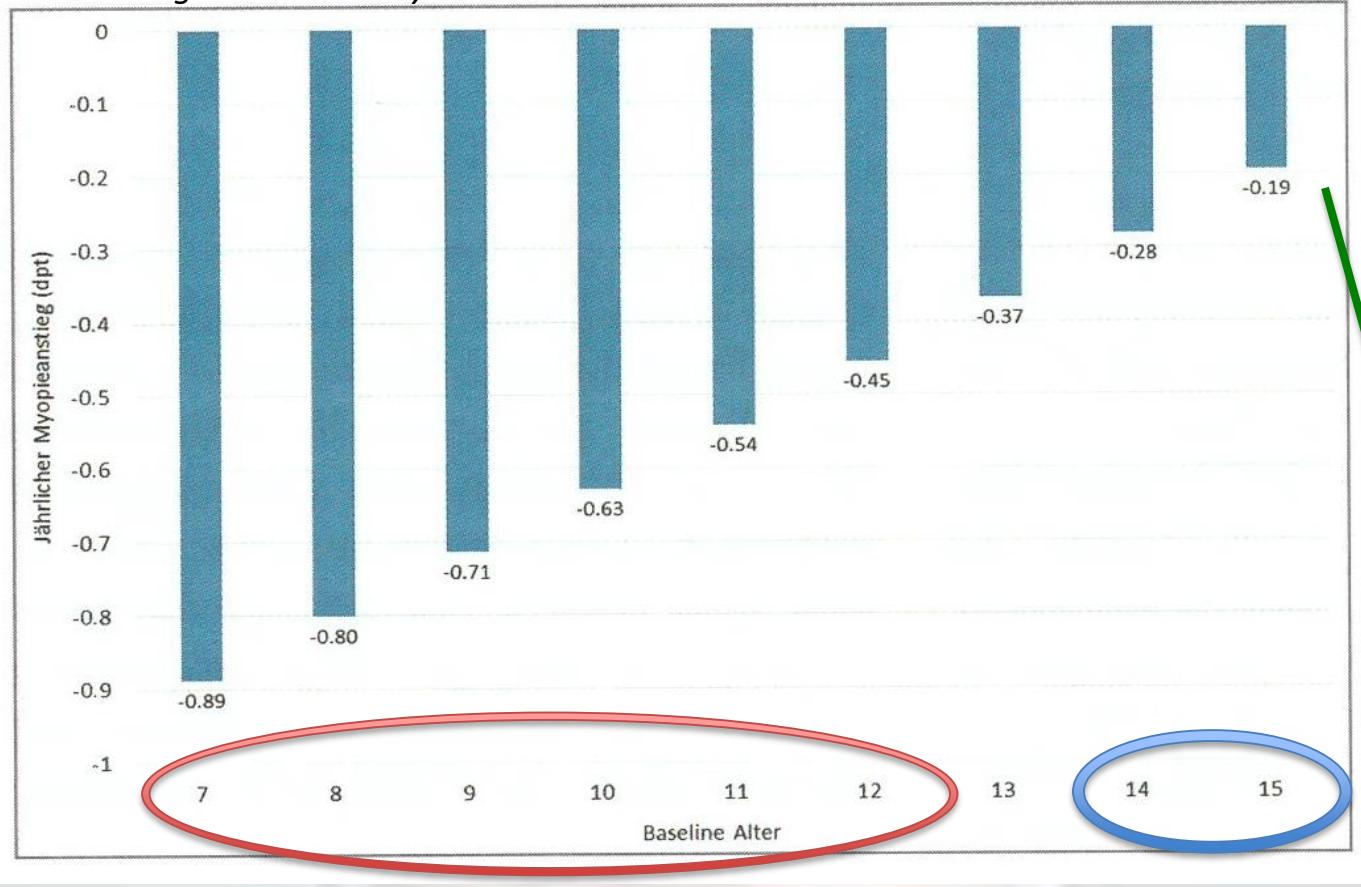
Many theories, often controversial results !

- **Genetics** (Wu und Edwards 1999, Morgan und Rose 2005, Foster und Jiang 2014)
- **Environment / Dopamin** (Feldkämper und Schäffel 2003, Jones et al 2007, Rose und Morgan 2008, Pan, Chen et al. 2015, Xiong et al 2017)
- **Emmetropization** (Xiang et al 2012, Zadnik et al 2015)
- **Close work / Digitalization** (McBrian et al 1993 (-), Lin et al 2004, Mutti und Zadnik 2009 (-), Wojciechowski 2011 (+), Mirshahi et al 2014 (+), Huang et al 2016 (-) )
- **Accomodative lag /Esophoria** (Gwiazda et al 2004 (-), Cheng et al 2014 (+), Huang et al 2016 (-) )
- **Peripheral Defocus**  
(Smith et al 2005/2013, Atchinson et al 2005, Cagnolati et al 2011)



# Myopiaprogression by Age

Sankaridurg und Holden: Eye 2014



„In most of our participants, Axial Length (AL) increases rapidly at younger ages and then slowed down and stabilized.“

Hou W. et al (COMET Group). Eye & Contact Lens: July 2018; Vol. 44/4, p.248-59

# Actually most used and studied therapies

- Outdoor time

**Update 2019**

(Planned and advertised, Digital Devices)



- Eye glasses

(prismatisch, bi-/multifokal, PDF, DIMS)



- Contact lenses

(bi-/multifokal, PDF, Ortho-Keratology)



- Pharmaceuticals

(Atropine LAMP, Pirenzepin)





## Myopia Prevention and Outdoor Light Intensity in a School-Based Cluster Randomized Trial

Vol. 125/8, p.1239-50, August 2018

Pei-Chang Wu, MD, PhD,<sup>1</sup> Chueh-Tan Chen, MS,<sup>1</sup> Ken-Kuo Lin, MD,<sup>2</sup> Chi-Chin Sun, MD, PhD,<sup>3</sup> Chien-Neng Kuo, MD,<sup>4</sup> Hsiu-Mei Huang, MD,<sup>1</sup> Yi-Chieh Poon, MD,<sup>1</sup> Meng-Ling Yang, MD,<sup>2</sup> Chau-Yin Chen, MD,<sup>4</sup> Jou-Chen Huang, MD,<sup>4</sup> Pei-Chen Wu, MD,<sup>4</sup> I-Hui Yang, MD,<sup>1</sup> Hun-Ju Yu, MD,<sup>1</sup> Po-Chiung Fang, MD,<sup>1</sup> Chia-Ling Tsai, DDS,<sup>5</sup> Shu-Ti Chiou, PhD,<sup>6,7,8,\*</sup> Yi-Hsin Yang, PhD<sup>9,\*</sup>

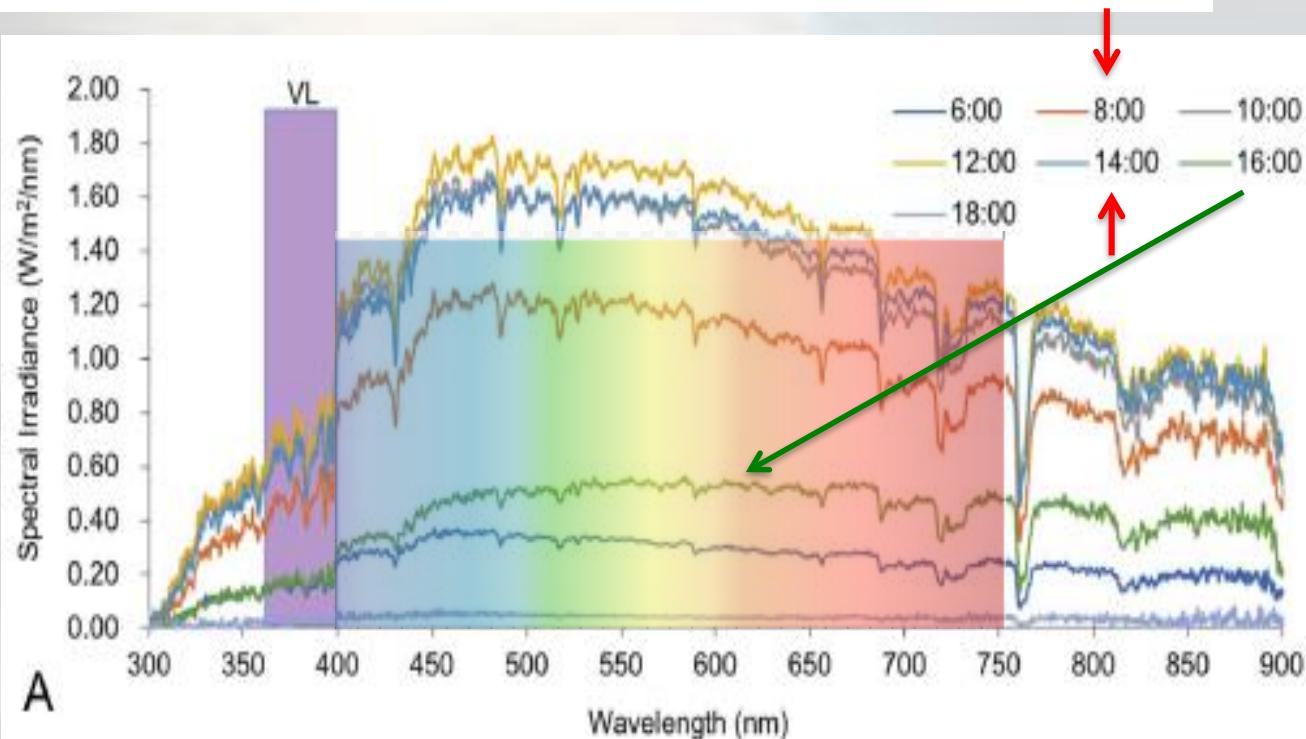
- Extensive study (!) of *only* 12 months duration
- Mean age 6.34 years (SD 0.48)
- Interesting and practicable interventions →
- “Myopic” shift 0.35D (Intervention) vs. 0.47D (control)  $p=0.002$
- Axial length grow 0.28mm (Intervention= **0.84D** ) vs. 0.33mm (control= **0.99D** )  $p=0.003$
- Overlap of interventions turns study results questionable

Table 1. Summary of Intervention Items between Recess Outside Classroom Trial 711 Program and Control Groups

Recess Outside Classroom Trial 711	Control
Recess outside classroom program	Yes
Outdoor-oriented school activities	No
Weekend sun-time passport assignment	Yes
Booklet for teacher-parent communication	No
Outdoor learning assignments in summer vacation	No
Eye health education for teachers and students, promote outdoor activity and 30/10 rule for myopia prevention.	Yes
Sport & Health 150: an initiative to promote an additional 150 minutes of exercise per week. This initiative was started during the late period of this study.	Yes
Tien-Tien 120: an initiative that promotes outdoor activities for 120 minutes daily. Although this initiative was not compulsory, 5% of the elementary schools in Taiwan were selected by the Bureau of Education for monitoring compliance with time outdoors. None of the schools in this study were among the selected schools.	Yes
30/10 = 30 minutes of near work followed by a 10-minute break.	

## Progress and Control of Myopia by Light Environments

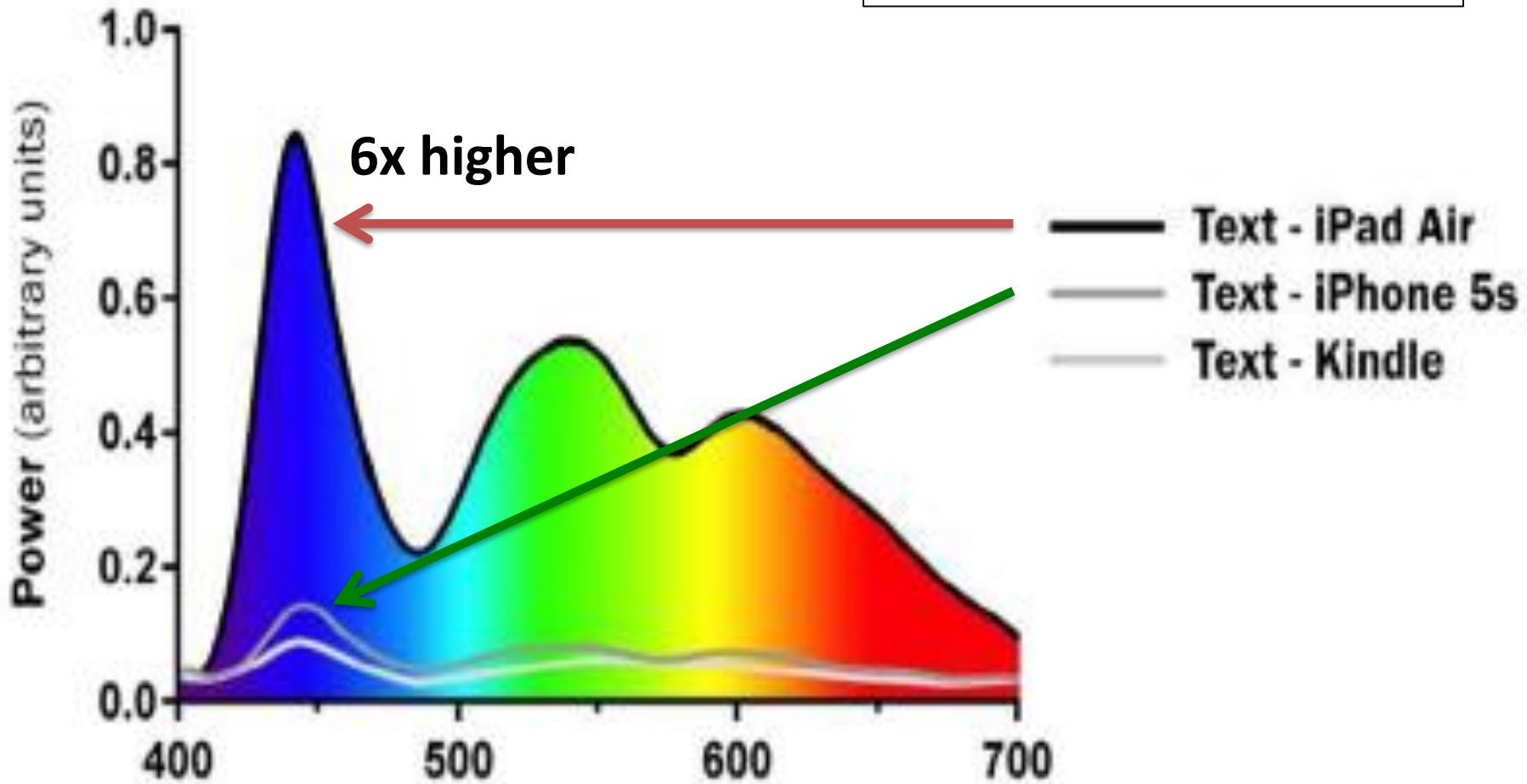
Xiaoyan Jiang, M.D., Toshihide Kurihara, M.D., Ph.D., Hidemasa Torii, M.D., Ph.D., and Kazuo Tsubota, M.D., Ph.D.





# Digital devices ?

*Tablet vs Smartphone*



# How bright are electronic devices?

TABLE 2 | Spectral distribution of human retinal photopigment-weighted measures from all light-emitting devices during different display conditions.

Prefix	Sensitivity	$\alpha$ -opic lux						
		Angry Birds ipad	Angry birds phone	Kids sleep Dr	Text ipad	Text ipad glasses	Text kindle	Text phone
Cyanopic	S cone	244.44	63.03	27.68	409.18	59.23	46.95	71.52
Melanopic	Melanopsin	176.25	46.49	31.51	302.33	64.55	34.62	54.54
Rhodopic	Rod	180.07	45.04	39.65	313.43	93.68	35.64	53.92
Chloropic	M cone	174.03	41.96	71.55	314.00	154.16	37.56	52.04
Erythropic	L cone	162.66	39.72	112.96	306.52	199.93	37.68	50.49
Photopic lux	lux	170.42	40.32	104.95	318.52	201.89	38.67	51.40
Irradiance	$\mu$ W/cm <sup>2</sup>	60.20	16.40	39.10	110.80	62.30	14.30	19.80
Photon flux	1/cm <sup>2</sup> /s	1.0E+14	4.4E+13	1.18E+14	3.0E+14	1.85E+14	3.90E+13	5.55E+13
Peak spectral irradiance	nm	445	450	610	445	605	455	450

The ability of the light devices to stimulate the human photopigments in the eye was assessed and is presented in this table.

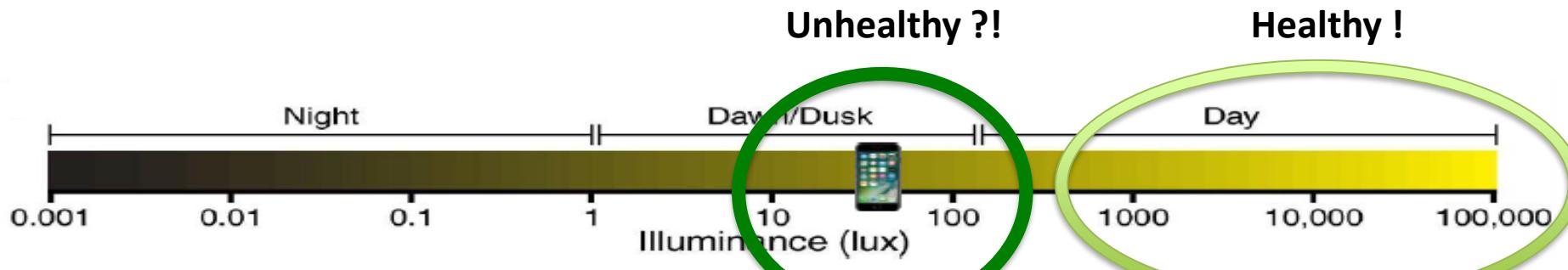
The potential ability of each light source to stimulate the S-cone (cyanopic), M-cone (chloropic), L-cone (erythropic), rods (rhodopic), and melanopsin (melanopic) photopigments, corrected for pre-receptoral filtering, was evaluated (16). The S-, M-, and L-cones make up the trichromatic visual system and melanopsin is the blue light sensitive irradiance detecting photopigment that is the primary contributor to the non-visual responses to light.

Light intensity irradiance is measured in microwatt per square centimeter. Photon flux is the number of photons that get delivered by the device per square centimeter per second.

Peak spectral irradiance is the wavelength (nanometer) of the peak where the irradiance is highest.

Gringras P, Middleton B, Skene DJ, Revell VL. Brighter, Bluer-Better? Current Light-Emitting Devices - Adverse Sleep Properties and Preventative Strategies. Front Public Health. 2015;3:233.

## Electronic devices are dim compared to outside lighting



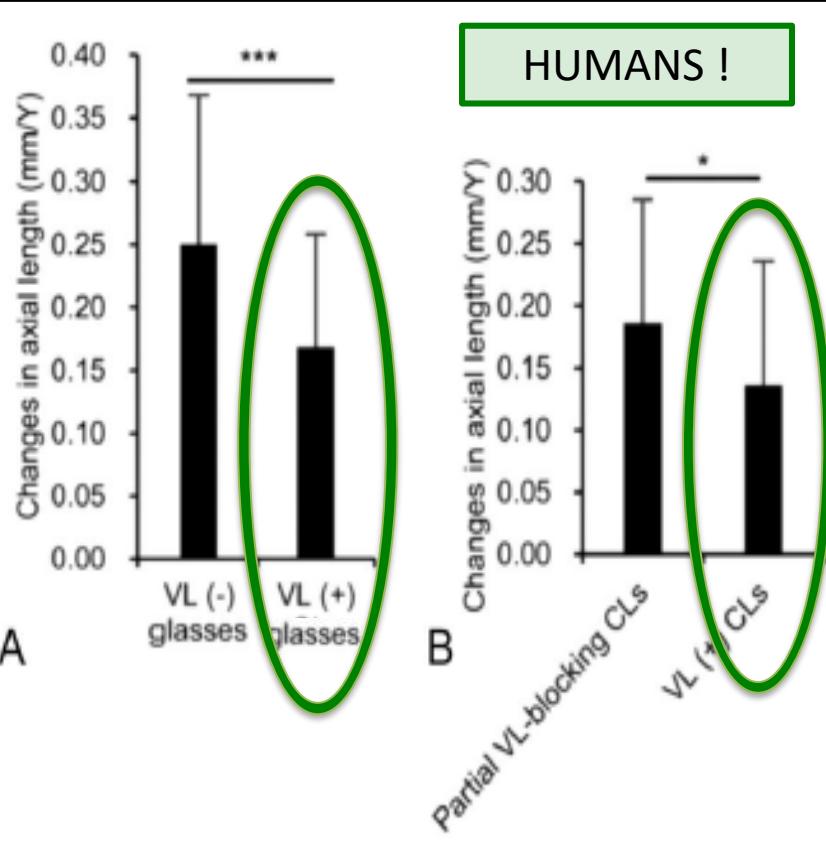


## Research Paper

# Violet Light Exposure Can Be a Preventive Strategy Against Myopia Progression



Hidemasa Torii <sup>a,b</sup>, Toshihide Kurihara <sup>a,b</sup>, Yuko Seko <sup>c</sup>, Kazuno Negishi <sup>a</sup>, Kazuhiko Ohnuma <sup>d</sup>, Takaaki Inaba <sup>a,e</sup>, Hiro Kondo <sup>a</sup>, Maki Miyauchi <sup>a,b</sup>, Yukihiro Miwa <sup>a,b</sup>, <sup>f</sup>, Kinya Tsubota <sup>b,g</sup>, Hiroshi Goto <sup>g</sup>, Mayumi Oda <sup>h</sup>,



Shinjuku-ku, Tokyo 160-8582, Japan  
 Shinjuku-ku, Tokyo 160-8582, Japan  
 Research Institute, National Rehabilitation Center for Persons with Disabilities, Tokorozawa-shi, Saitama 359-8555, Japan  
 Chiba 263-8522, Japan  
 8916-16 Takayama-cho, Ikoma-shi, Nara 630-0101, Japan  
 81-3627, Japan  
 Shinjuku-ku, Tokyo 160-0023, Japan  
 University School of Medicine, 35 Shinanomachi, Shinjuku-ku, Tokyo 160-8582, Japan  
 75, Japan

*protein I (EGR-I)* in the chick retina, which showed that VL might prevent myopia through pathways independent to other wavelengths. The mechanism behind VL for myopia control must not be simple, and more works still need to be performed. Recently, we

# Environment and humans !

- “Increased time outdoors is effective in preventing the onset of myopia as well as in slowing down the myopic shift in refractive error. But paradoxically, outdoor time was not effective in slowing progression in eyes that were **already myopic.**”

(Xiong et al.: Meta-Analyse/Review, Acta Ophthalmologica 2017)





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*Eye & Contact Lens* • Volume 44, Number 4, July 2018

REVIEW ARTICLE

OPEN

## A Review of Current Concepts of the Etiology and Treatment of Myopia

*Jeffrey Cooper, M.S., O.D., F.A.A.O. and Andrei V. Tkatchenko, M.D., Ph.D.*



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Ophthalmology Volume 126, Number 1, January 2019

## Low-Concentration Atropine for Myopia Progression (LAMP) Study

*A Randomized, Double-Blinded, Placebo-Controlled Trial of 0.05%, 0.025%, and 0.01% Atropine Eye Drops in Myopia Control*

Jason C. Yam, FCOphthHK, FRCS(Edin),<sup>1</sup> Yuning Jiang, MMED,<sup>1</sup> Shu Min Tang, PhD,<sup>1</sup> Antony K.P. Law, MSc,<sup>1</sup> Joyce J. Chan, MRCSEd(Ophth),<sup>1</sup> Emily Wong, MBChB, MRCS(Edin),<sup>1</sup> Simon T. Ko, FCOphthHK, FHKAM(Oph),<sup>2</sup> Alvin L. Young, MMedSc(Hons), FRCOphth,<sup>1,3</sup> Clement C. Tham, FCOphthHK, FRCOphth,<sup>1</sup> Li Jia Chen, MRCSEd(Ophth), PhD,<sup>1,3</sup> Chi Pui Pang, DPhil<sup>1</sup>

# Atropine (1% vs 0.5% vs 0.1% vs 0.01%)

ATOM 2 Study

## A Review of Current Concepts of the Etiology and Treatment of Myopia

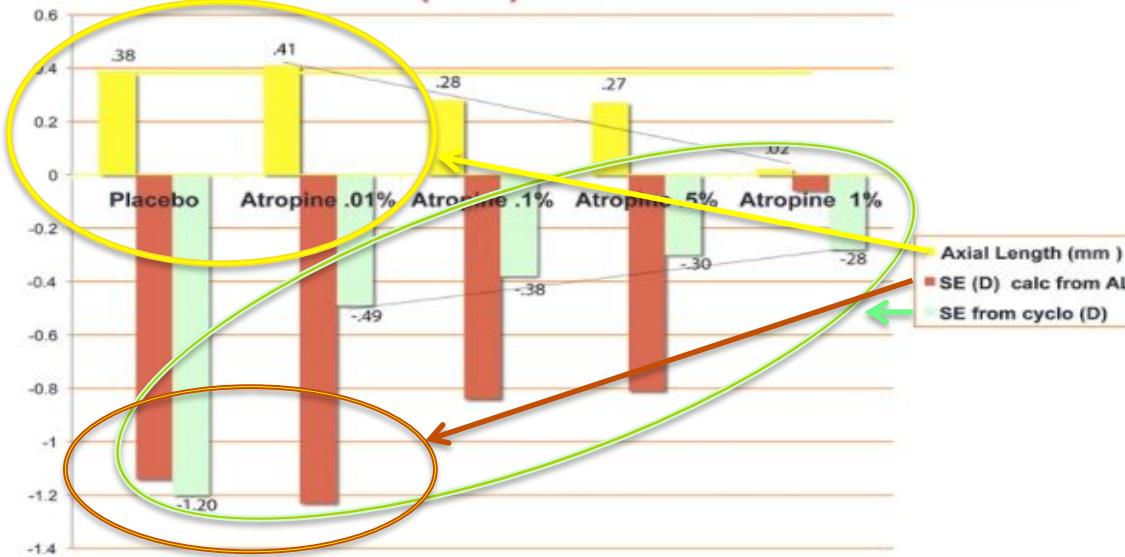
Jeffrey Cooper, M.S., O.D., F.A.A.O. and Andrei V. Tkatchenko, M.D., Ph.D.



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FIG. 10.

### Changes in Axial Length and Spherical Equivalent (SE) Over 2 Years of Time



Changes in AL and SPH EQ after 2 years of treatment. Figure 10 depicts the changes in axial length in millimeters (yellow bars going up); spherical equivalent in diopters calculated from the derived from the ATOM 1 study for atropine 1% and placebo and ATOM 2 for atropine 0.01%, 0.1%, and 0.5%, respectively. It is readily apparent that there is no real difference between axial length measurements after 24 months between placebo and atropine 0.01%; moderate changes with atropine 0.1% and 0.5%; and dramatic changes with atropine 1% (yellow bars). However, the effect of atropine 0.01% and atropine 1% is not nearly as great as the concentration differences.

# What do we learn ?

**Dosis, Dosis, Dosis !**

Reduction of myopia progression (SE)



Reduction of axial lenght grow (AL)

# Atropine 0.05% vs 0.025% vs 0.01% (LAMP Study)



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Ophthalmology Volume 126, Number 1, January 2019

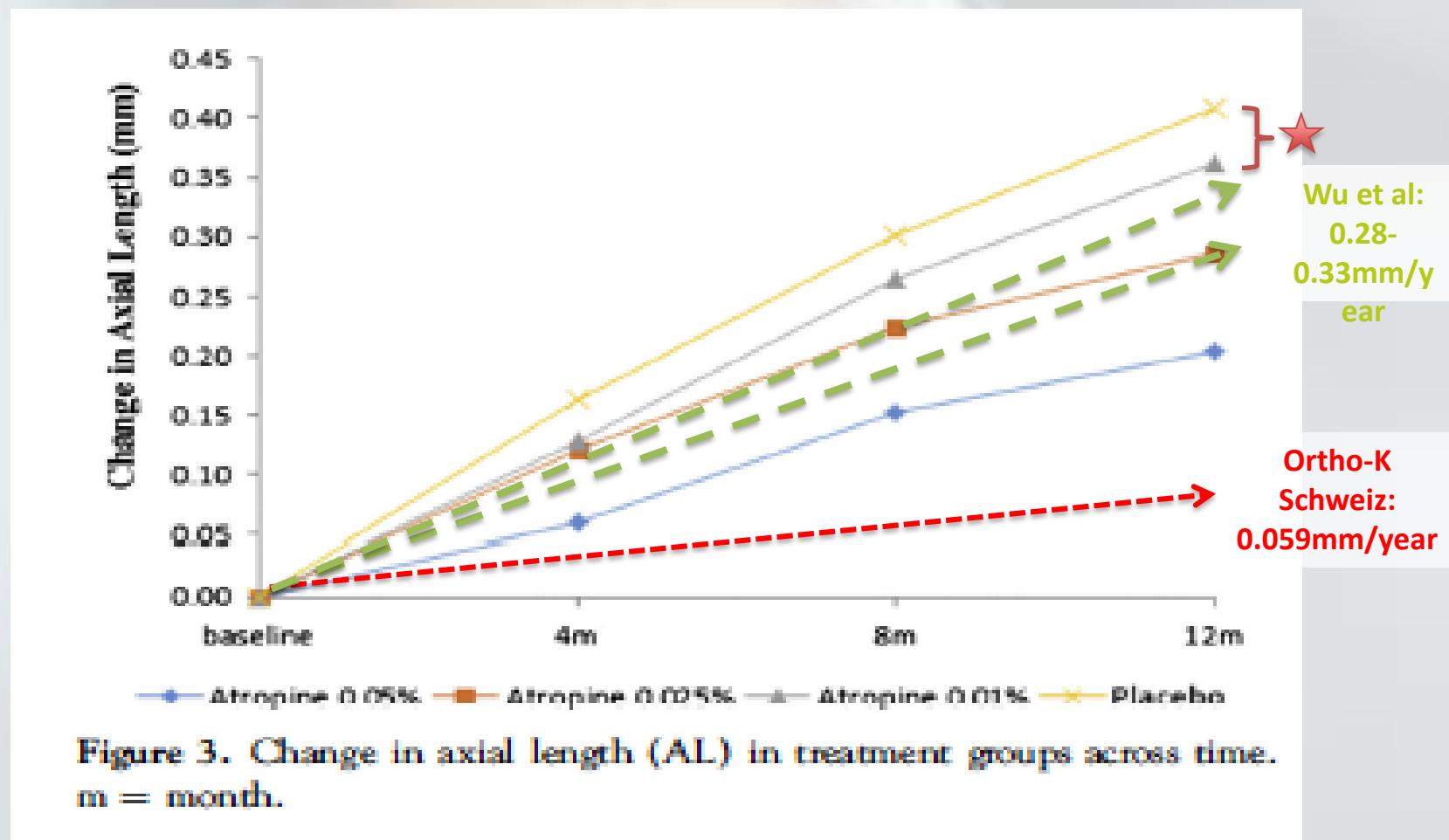
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# Atropine 0.05% vs 0.025% vs 0.01% (LAMP Study)



It should be noted that the difference of AL changes between the 0.01% atropine and placebo groups in our study also was not significant, which was consistent with the AL results of ATOM 2. The efficacy of 0.01%

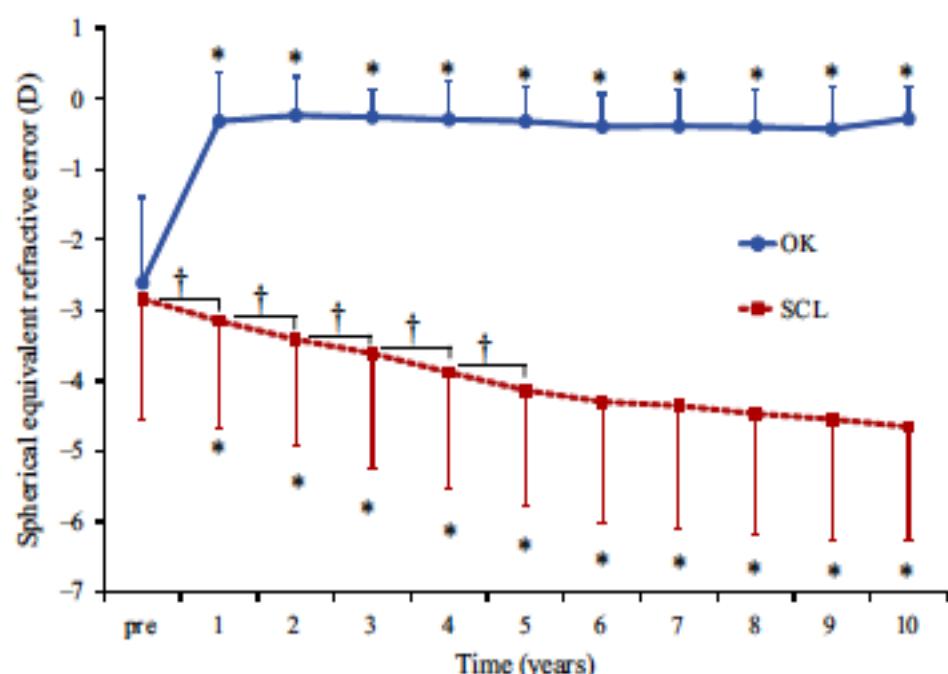


## Safety and efficacy following 10-years of overnight orthokeratology for myopia control

Takahiro Hiraoka<sup>1</sup> \*, Yasuo Sekine<sup>2</sup>, Fumiki Okamoto<sup>1</sup>, Toshifumi Mihashi<sup>1</sup> and Tetsuro Oshika<sup>1</sup>

<sup>1</sup>Faculty of Medicine, Department of Ophthalmology, University of Tsukuba, Ibaraki, and <sup>2</sup>Kashiwa Eye Clinic, Chiba, Japan

Citation information: Hiraoka T, Sekine Y, Okamoto F, Mihashi T & Oshika T. Safety and efficacy following 10-years of overnight orthokeratology for myopia control. *Ophthalmic Physiol Opt* 2018; 38: 281–289. <https://doi.org/10.1111/opo.12460>



In conclusion, the present findings showed that OK treatment was effective in slowing myopia progression over a 10-year treatment period and demonstrated a clinically acceptable safety profile among patients between the ages of 8 and 16 years. Patients undergoing OK treatment do not need to wear any vision-correction aids during day-

Figure 1. Changes over time in manifest refraction for the OK and SCL groups. OK, orthokeratology; SCL, soft contact lens. \*Statistically significant differences compared to the baseline value by the Bonferroni post-hoc test. †Statistically significant differences between successive years by the Bonferroni post-hoc test.

Ophthalmologe  
<https://doi.org/10.1007/s00347-019-0874-6>

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Berufsverband der Augenärzte Deutschlands e. V. (BVA)<sup>1</sup> · Deutsche Ophthalmologische Gesellschaft (DOG)<sup>2</sup>

<sup>1</sup> Berufsverband der Augenärzte Deutschlands e. V., Düsseldorf, Deutschland

<sup>2</sup> Deutsche Ophthalmologische Gesellschaft, München, Deutschland

## Empfehlungen bei progredienter Myopie im Kindes- und Jugendalter

Stellungnahme von DOG und BVA. Stand Dezember 2018

tes Atropin in einer Konzentration von 0,01 % die Myopieprogression signifikant mindert. Das Ausmaß der Progressionsminderung liegt bei bis zu 50 %. Das Si-

Vergleichbare progressionsmindernde Effekte von bis zu 50 % werden der Orthokeratologie nachgesagt [28–30].

# Ortho-Keratology and MK !

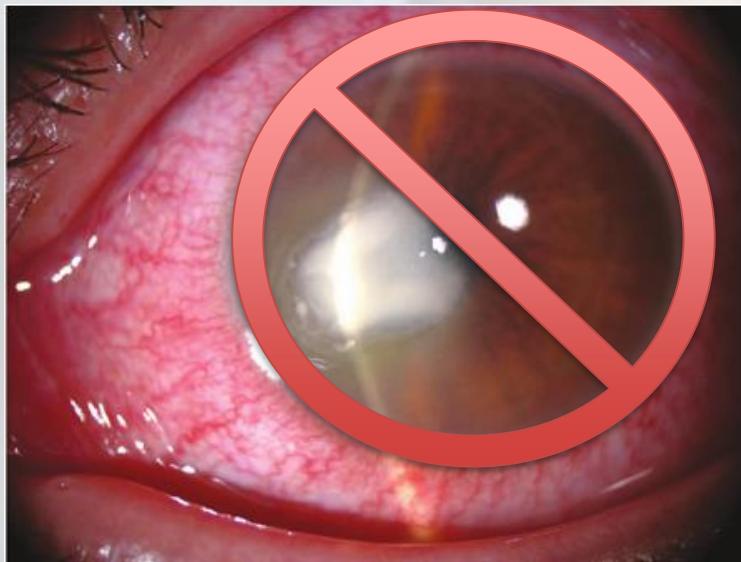
AMERICAN JOURNAL  
OF OPHTHALMOLOGY®

## Orthokeratology-Associated Infectious Keratitis in a Tertiary Care Eye Hospital in Hong Kong

[Tommy C.Y. Chan](#), [Emmy Y.M. Li](#), [Victoria W.Y. Wong](#), [Vishal Jhanji](#)  

Hong Kong Eye Hospital, Hong Kong SAR, China; and Department of Ophthalmology & Visual Sciences, The Chinese University of Hong Kong, Hong Kong SAR, China

[Am J Ophthalmol.](#) 2014 Dec;158(6):1130-1135.e2. doi: 10.1016/j.ajo.2014.08.026. Epub 2014 Aug 23.



[Infection.](#) 2017 Dec;45(6):727-735. doi: 10.1007/s15010-017-1023-2. Epub 2017 May 22.

### Infectious keratitis and orthokeratology lens use: a systematic review.

[Kam KW<sup>1,2</sup>](#), [Yung W<sup>2</sup>](#), [Li GKH<sup>1,2</sup>](#), [Chen LJ<sup>1,2</sup>](#), [Young AL<sup>3,4</sup>](#).

173 cases\* (>85% by <2010)

Case reports and series 2002 – 2010/16

0.77 cases / 1'000 Px\*\*

[Optom Vis Sci.](#) 2013 Sep;90(9):937-44. doi: 10.1097/OPX.0b013e31829cac92.

### The risk of microbial keratitis with overnight corneal reshaping lenses.

[Bullimore MA<sup>1</sup>](#), [Sinnott LT](#), [Jones-Jordan LA](#).



OPEN

## Level of Compliance in Orthokeratology

*Jiang Jun, M.D., Bian Zhiwen, M.D., Wang Feifu, M.D., O.D., Lian Lili, M.D., and Lu Fan, M.D., O.D.*

**Conclusions:** The level of compliance with ortho-k lens wear in Mainland China is not high, necessitating ECPs to stress to patients the details of wear and care behaviors, especially avoiding exposing lenses to nonsterile solution. Improving monitoring of follow-up visits, particularly within the first 9 months of wearing ortho-k lenses, is needed.

# Does Ortho-K fitting quality matters ?

China, July 2018

OK fitting rally, 5 clinics in 3 weeks

150-300 patients per day !



Schlaglicht der Schweizerischen Ophthalmologischen Gesellschaft

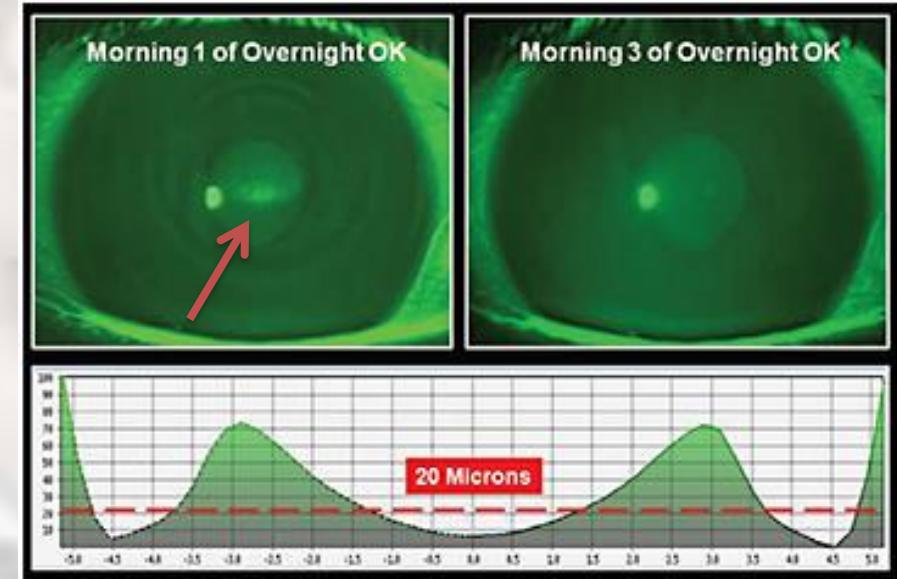
# Refraktion und Kontaktlinsen

**Dr. med. Albert Franceschetti**

Präsident der Kontaktlinsenkommission der Schweizerischen Ophthalmologischen Gesellschaft, Meyrin



Myopie ist weltweit ein ernsthaftes Problem. Zwei Behandlungsmethoden gelten als wirksam. Bei weichen Kontaktlinsen gibt es drei Fehler, die es zu vermeiden gilt.



Schlaglicht der Schweizerischen Ophthalmologischen Gesellschaft

# Refraktion und Kontaktlinsen

Dr. med. Albert Franceschetti

Präsident der Kontaktlinsenkommission der Schweizerischen Ophthalmologischen Gesellschaft, Meyrin



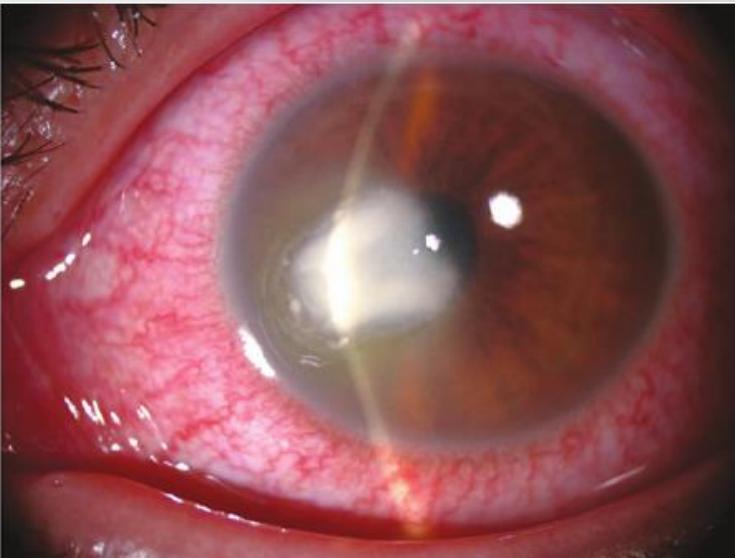
Myopie ist weltweit ein ernsthaftes Problem. Zwei Behandlungsmethoden gelten als wirksam. Bei weichen Kontaktlinsen gibt es drei Fehler, die es zu vermeiden gilt.



Albert Franceschetti

Orthokeratologie darf nur von Fachleuten durchgeführt werden. Bisher wird sie erst von wenigen Optometristen angewendet und ist kostenintensiv was ihre Anwendung begrenzt. Darüber hinaus besteht bei dieser Behandlungsform ein Infektionsrisiko. In orientalischen Ländern kam es häufig zu Infektionen, jedoch nur, weil dort die Hygieneregeln nicht korrekt befolgt wurden, und die Methode von Nichtfachleuten unsachgemäß angewendet wurde.

Bei uns hingegen werden die Hygienevorschriften im Allgemeinen beachtet und Anweisungen der Fachleute besser eingehalten. Überdies sind Optometristen, die diese Behandlungsmethode anbieten, seriöse Fachpersonen. Zudem verfügen die heutigen Kontaktlinsen über eine hohe Sauerstoffpermeabilität, wodurch die Hornhaut ausreichend mit Sauerstoff versorgt wird.



**Figure 1** Acute-onset postoperative endophthalmitis (note the sutured corneal wound and hypopyon).

## „Microbial Keratitis with Ortho-K“

0.77 cases / 1'000 Px

Optom Vis Sci. 2013 Sep;90(9):937-44. doi: 10.1097/OPX.0b013e31829cac92.

### The risk of microbial keratitis with overnight corneal reshaping lenses.

Bullimore MA<sup>1</sup>, Sinnott LT, Jones-Jordan LA.

## „Serious Adverse Events After Cataract Surgery“

42.08 cases / 1'000 Px



### NIH Public Access Author Manuscript

*Curr Opin Ophthalmol.* Author manuscript; available in PMC 2013 September 19.

Published in final edited form as:

*Curr Opin Ophthalmol.* 2012 May ; 23(3): 219–225. doi:10.1097/ICU.0b013e3283524068.

### Serious Adverse Events After Cataract Surgery

**Joshua D. Stein, MD, MS**

Department of Ophthalmology and Visual Sciences, University of Michigan Medical School

# Atropine **AND** Contact Lenses

	Wirkungsweise	Effekt nachgewiesen	Einfachheit der Anwendung	Kosten	Medikamentöse Nebenwirkungen	Optische Nebenwirkungen	Rebound Effekt nach Absetzen	Zulassung (zur chron. Anwendung)	Risiko	Eltern
Atropin 0.01% - 1%	Muscarin-antagonist	+ bis +/- Atropin 0.01% bis 0.05% ++ Atropin 0.5% bis 1%	++	++	+ ohne KS +/- mit KS (BAC !)	+/- Atropin 0.01% bis 0.05% - bis -- Atropin 0.5% bis 1%	+ Atropin 0.01% - bis -- Atropin 0.5% bis 1%	- (++) FDA evt. 2020	++ ohne KS	Chronische Medikamentengabe Unverträglichkeit
Kontaktlinsen	Korrektur des zentralen und peripheren Defokus	+ Ortho-K (+/-) MiSight +/- PDMCL	+ Ortho-K ++ MiSight + PDMCL	+/- Ortho-K + MiSight + PDMCL	+ Ortho-K (Peroxid) ++ MiSight + PDMCL (Peroxid)	+ Ortho-K + MiSight + PDMCL	- (< 14 jährig) + > 16 jährig	+ Ortho-K ++ MiSight - +/- PDMCL	+ Ortho-K ++ MiSight + PDMCL	Handhabung Kontaktlinse Sicherheit Kosten

# Synergy: Atropin **AND** Contact Lens



Journal of  
*Clinical Medicine*



Article

## The Synergistic Effects of Orthokeratology and Atropine in Slowing the Progression of Myopia

Lei Wan <sup>1,2,3,4,\*</sup>, Chang-Ching Wei <sup>5,6</sup>, Chih Sheng Chen <sup>1,7</sup>, Ching-Yao Chang <sup>2</sup>,  
Chao-Jen Lin <sup>8,9</sup>, Jamie Jiin-Yi Chen <sup>10</sup>, Peng-Tai Tien <sup>6,10,11</sup> and Hui-Ju Lin <sup>1,10,\*</sup>

<sup>1</sup> School of Chinese Medicine, China Medical University, Taichung 404, Taiwan

<sup>2</sup> Department of Biotechnology, Asia University, Taichung 413, Taiwan; cychang@asia.edu.tw

<sup>3</sup> Department of Obstetrics and Gynecology, China Medical University Hospital, Taichung 404, Taiwan

<sup>4</sup> Research Center for Chinese Medicine & Acupuncture, China Medical University, Taichung 404, Taiwan

<sup>5</sup> Children's Hospital, China Medical University Hospital, Taichung 404, Taiwan; weilonger@gmail.com

<sup>6</sup> College of Medicine, China Medical University, Taichung 404, Taiwan; u702054@hotmail.com

<sup>7</sup> Division of Chinese Medicine, Asia University Hospital, Taichung 413, Taiwan; pluto915@mail2000.com.tw

<sup>8</sup> Department of Pediatrics, Changhua Christian Children's Hospital, Changhua 500, Taiwan;  
124140@cch.org.tw

<sup>9</sup> School of Medicine, Chung Shan Medical University, Taichung 402, Taiwan

<sup>10</sup> Department of Ophthalmology, China Medical University Hospital, Taichung 404, Taiwan;  
jane.editing@gmail.com

<sup>11</sup> Graduate Institute of Clinical Medical Sciences, China Medical University, Taichung 404, Taiwan

\* Correspondence: leiwan@mail.cmu.edu.tw or lei.joseph@gmail.com (L.W.);  
d2396@mail.cmuh.org.tw (H.-J.L.); Tel.: +886-(0)4-22053366 (ext. 3326) (L.W.);  
+886-(0)4-22053366 (ext. 3326) (H.-J.L.)

Received: 3 August 2018; Accepted: 5 September 2018; Published: 7 September 2018



# Synergy: Atropin **AND** Contact Lens

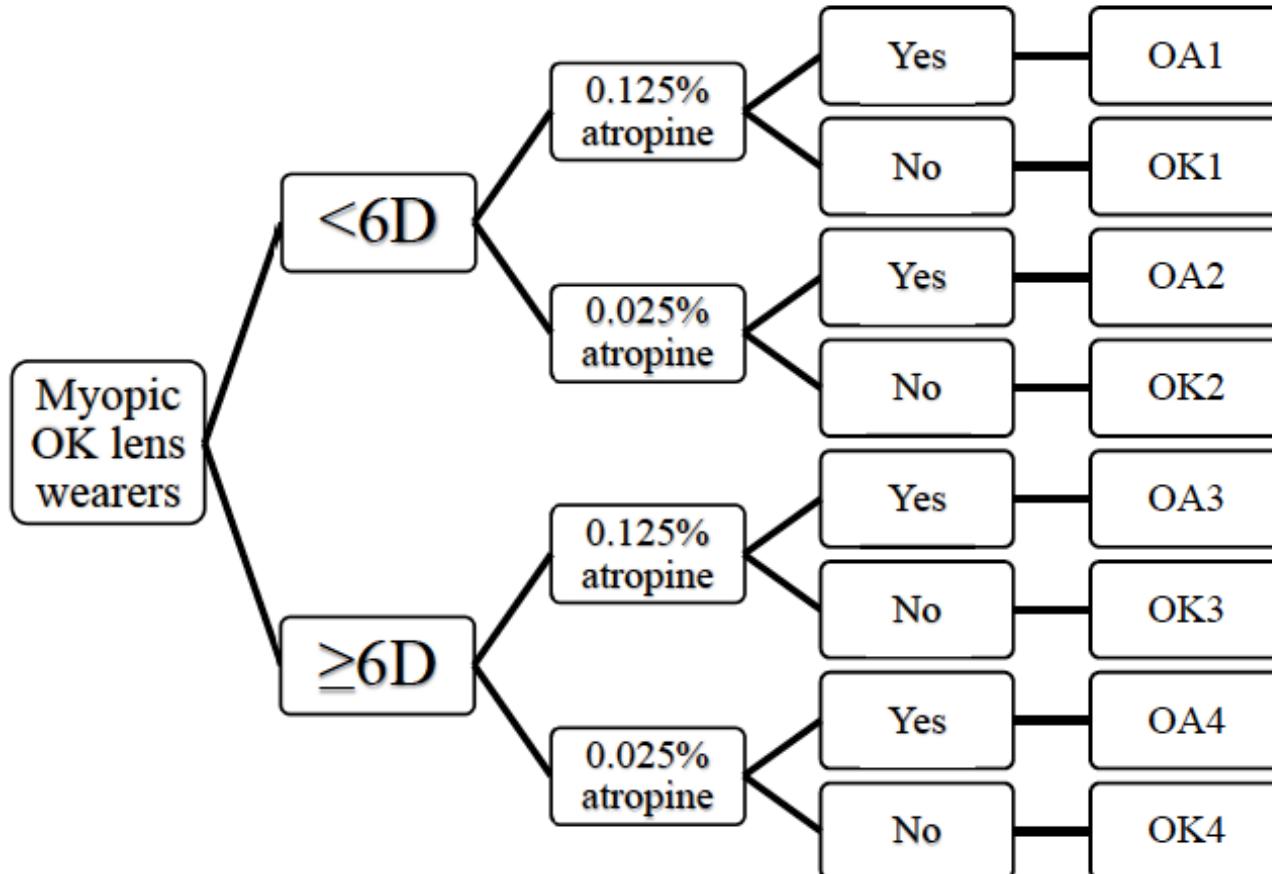


Figure 1. Treatments and groupings of subjects (OK—orthokeratology; OA—orthokeratology + atropine).

# Synergy: Atropin **AND** Contact Lens

**Table 1.** The effect of 0.125% and 0.025% atropine on orthokeratology (OK)-treated patients with spherical equivalent <6 D.

	Atropine (0.125%)		<i>p</i> -Value	Atropine (0.025%)		<i>p</i> -Value
	Yes (OA1) (N = 20)	No (OK1) (N = 26)		Yes (OA2) (N = 20)	No (OK2) (N = 20)	
Age	10.6 ± 1.2	10.2 ± 1.7	>0.05	10.4 ± 1.3	10.3 ± 1.4	>0.05
Female: male #	1:1	1:1		1:1	1:1	
Axial length (mm)						
Baseline	24.12 ± 1.28	24.32 ± 1.53	>0.05	24.08 ± 1.31	24.19 ± 1.24	>0.05
 2 years	24.67 ± 1.55	24.9 ± 1.98	0.042	24.72 ± 1.53	25.01 ± 1.26	0.031
Difference in axial length	0.55 ± 0.12	0.58 ± 0.09	0.022	0.65 ± 0.18	0.83 ± 0.16	0.029
Spherical equivalent (D)						
Baseline	4.25 ± 1.75	4.25 ± 1.25	>0.05	4.53 ± 1.23	4.63 ± 1.35	>0.05
2 years	4.75 ± 0.75	4.8 ± 0.5	0.041	4.83 ± 1.12	5.13 ± 1.56	0.039
Accommodation						
Baseline	16.2 ± 3.1	16.7 ± 3.4	>0.05	16.3 ± 3.2	16.5 ± 3.4	>0.05
2 years	4.2 ± 2.7	16.3 ± 3.2	<0.001	4.6 ± 1.56	16.4 ± 3.2	<0.001

- Additional positive effect in 3 of 4 groups

# The Shelter-Principle in Myopia Management

Consequent aftercare and co-operation

Update  
2019



Atropine  
0.01-0.05%

**AGE** e.g. 5 – 9+ yo

Outdoor  
Sunlight

0 – >16 yo

Contact  
Lenses

e.g. 8 – >16 yo

## Der Ophthalmologe

Leitlinien, Stellungnahmen und Empfehlungen



Berufsverband der Augenärzte Deutschlands e. V. (BVA)<sup>1</sup> · Deutsche Ophthalmologische Gesellschaft (DOG)<sup>2</sup>

<sup>1</sup>Berufsverband der Augenärzte Deutschlands e. V., Düsseldorf, Deutschland

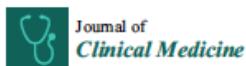
<sup>2</sup>Deutsche Ophthalmologische Gesellschaft, München, Deutschland

## Empfehlungen bei progredienter Myopie im Kindes- und Jugendalter

Stellungnahme von DOG und BVA. Stand Dezember 2018



INTERNATIONAL  
**MYOPIA**  
INSTITUTE



Article

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REVIEW ARTICLE

## A Review of Current Concepts of the Etiology and Treatment of Myopia

Jeffrey Cooper, M.S., O.D., F.A.A.O. and Andrei V. Tkatchenko, M.D., Ph.D.

SCHLAGLICHTER 2018

35

Schlaglicht der Schweizerischen Ophthalmologischen Gesellschaft

## Refraktion und Kontaktlinsen

Dr. med. Albert Franceschetti

Präsident der Kontaktlinsenkommission der Schweizerischen Ophthalmologischen Gesellschaft, Meyrin



Myopie ist weltweit ein ernsthaftes Problem. Zwei Behandlungsmethoden gelten als wirksam. Bei weichen Kontaktlinsen gibt es drei Fehler, die es zu vermeiden gilt.

2 Übersicht



## Myopie-Progression: Aktueller Stand der Forschung

Michael Bartschi, Bern

### Epidemiologie

Weltweit liegt die Prävalenz der Myopie bei 10–30 % in Ozeanien, Afrika und Südamerika, bei 30–40 % in Europa,

verbrachte Zeit<sup>14,18</sup> oder Exposition bestimmter Wellenlängen<sup>16,19</sup>, der refraktive Fehler (peripherer Defokus<sup>20,21</sup> und Accommodation/Konvergenz<sup>22</sup>) und der Ausbildungsgrad.<sup>2,8</sup>

In der Entwicklung/Erprobung befindliche refraktive oder visual-therapeutische Verfahren:  
– Brillengläser (MyoSmart und MyoVision)

# Single dose Atropine 0.01% in CH ?

- **Bichsel Laboratorium Interlaken**
- oder
- **TopPharm Apotheke Meyer Sursee**

# What we learned so far

Myopia progression is :

- Multifactorial and strongly related to age
- Potentially pathological for growing eyeballs
- Evidence based and clinically proven efficient strategies/therapies exist
- Sunlight works mainly during emmetropization phase, very weak correlation for inhibition in already myopic eyes
- Optimal sunlight/outdoors hours from 8 to 14
- Smart phones are less a risk
- **Combination of low dose Atropine and CL works the best**



# Conclusion / Take Home

- Act EARLY / young and consequent !
- Inform child and parents neutral and evidence based
- Choose the right therapy depending the age, the actual myopia, the progression rate and the attitude of the parents and the child.
- **Adjust and combine strategies over time !**
- Co-operation of Ophthalmologist and Optometrist is evident



# Herzlichen Dank

The screenshot shows the eyeness website's 'Downloads' page. The header includes the logo 'kontaktlinsenstudio bärtschi', navigation links for PORTRAIT, DIENSTLEISTUNGEN, PRODUKTE, NEWS, KONTAKT, K2 - THE DOUBLE, and social media links. The main content area features a large image of sand dunes under a blue sky. The title 'DOWNLOADS' is in blue, followed by a text block about the purpose of the page. Below is a search bar and a table of download links:

	Autor	Größe	Datum
<a href="#">PDF Weitsicht in Extremis, "die Kontaktlinse"</a>		1.51 MB	20.12.2018
<a href="#">PDF OCT und Fundus Workshop, Medicollect Academy</a>		5.33 MB	15.10.2018
<a href="#">PDF Optometrie im Alltag - Tag der Optometrie, München</a>		3.03 MB	14.10.2018
<a href="#">PDF Use of therapeutic contact lenses in Epidermolysis Bullosa Dystrophica, DEBRA Congress</a>		1.75 MB	09.09.2018
<a href="#">PDF Orthokeratologie und Presbyopie - Artikel "die kontaktlinse"</a>		109.45 KB	15.08.2018
<a href="#">PDF much more than perfect vision - M.Sc. Kurs Benediktbeuren DE</a>		3.58 MB	09.06.2018
<a href="#">PDF Weiche torische Kontaktlinsen bei Astigmatismus - ein Fallbericht / die kontaktlinse</a>		4.75 MB	22.05.2018
<a href="#">PDF Tannihile Hydro-PFG Lmnia Club</a>		1.42 MB	12.03.2018

At the bottom, there are links for 'NOTFÄLLE' and 'DOWLOADS'. A blue arrow points from the text 'Swiss Academy of Ophthalmology' to the 'DOWLOADS' link.

Dr. Michael Bärtschi

Ph.D. in Biomedicine (ARVO)

M.Sc.Optom. et M.med.Education (FAAO)

mbaertschi@eyeness.ch

[www.eyeness.ch](http://www.eyeness.ch)

Swiss Academy  
of Ophthalmology



Luzern, 7. March 2019

# Voting:

Will you practicing myopia management  
in the future ?

- A. Yes, more than before
- B. Yes, but less than before
- C. No
- D. Uncertain