Questions and Answers – Myopia Webinar

1. Hallo. How can We doing for stop progress myopia? Based on the references we cannot promise to stop, just to slow down the progression of myopia. The different methods for myopia control (to slow down the progression) you can find in the Myopia Webinar or in the "Update and guidance on management of myopia. European Society of Ophthalmology in cooperation with International Myopia Institute" published in the EJO this May. The link: https://journals.sagepub.com/doi/full/10.1177/1120672121998960 or https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8369912/. The most important measures to reduce myopia progression are: atropine eye drops, ortho-K or costumized ortho-K contact lenses, myopia control soft contact lenses. In cases of further progression, there is a need to switch to combination therapy

2. What are the recommendations regarding myopia and pregnancy and does this mean that we can expect more births completed by cesarean section in future? According to some studies, some pregnant women may experience a myopic shift during their pregnancy, possibly due to changes in corneal thickness or lens curvature. In such cases, refractive error tends to return to pre-pregnancy level after delivery. During pregnancy, changes occur in the cardiovascular, hormonal, metabolic, hematologic, and immunologic system. Undoubtedly, this adaptation process has an impact on the ocular system. Some authors have suggested that water retention during pregnancy induces changes on corneal thickness and curvature, and these changes could modify the corneal refractive index. Hormonal changes may also play a role since progestins and estrogens increase the permeability of the crystalline lens to water, thus reducing the refractive index. On the other hand, another study suggests that pregnancy is inversely associated with myopia progression, whereby pregnant women are less likely to progress than their non-pregnant counterparts. Pregnancy can also lead to contact lens intolerance due to dry eye problems caused by disruption of lacrimal acinar cells. Therefore, spectacles may be a better option in such cases during pregnancy. These ocular changes usually resolve in postpartum. Both contact lens and spectacle option are acceptable options, depending on the mother's preference. Consider with a mother of an infant that she will need to wake up during the night to feed the baby, so the practicalities of Ortho K may not suit.
3. How long should we use atropine? Children at the age 7-12 year old there is a rapid progression in myopia, so we have to continue atropin. At the age of 15 48% of the children stabilize myopia. The withdrawal of atropin, there is recommendation from Chia (Chia A and Tay SA. Clinical management and control of myopia in children. In: Ang M and Wong TY (eds) *Updates on myopia. A clinical perspective*. 1st ed. Singapore: Springer, 2020, pp.187–200.), which based on the ATOM 2 study, which reported, that 0.01% atropine resulted in a 60% risk of a refractive error rebound effect in children aged 8–10 years, compared to 30% at age 10-12 years and 8% after the age of 12 years, so in children younger than 12 years who showed no progression in the past year, atropine 0.01% may be slowly tapered by reducing drop frequency (by 1–2 days/week each year). However, if children are older than 12 years, then the

frequency of eye drops could be tapered more quickly (by 1–2days/week every 6 months). Using this regime, most children will be off medication by about 14-15 years of age. And what about side effects of higher dose atropine? Higher dose atropin (cc:0.1-0.5%) could have unacceptable level of mydriasis (3,0 mm), but lower doses (0.01-0.025%) are not enough effective on axial length growth, so the best position is somewhere in between (cc: 0.05%) How recommended it is to use high dose atropine? A recent study in school children tested a novel 1% atropine treatment regimen in which one eye was treated at one time point and the other eye at another time point (one eye received treatment at day 1, the other eye received treatment at day 16) achieving a frequency of once a month in the first 2years. Gradual withdrawal of the atropine to once every 2months for 12months, followed by no drops for 12months, could effectively retard the progression of moderate myopia with a significant reduction in myopic rebound, while minimizing the side effects (Zhu Q, et al. Efficacy and safety of 1% atropine on retardation of moderate myopia progression in Chinese school children. *Int J Med Sci* 2020; 17: 176–181.)

4. I have heard that there is difference between „Asian“ and „European“ myopia - histology, genetics. Is this true? Could it affect the effectiveness of the atropine or other pharmacological treatment? There are no data that the atropine therapy is less effective in Europeans than in Asians, while one has to await for the results of ongoing studies. Despite some minor genetic differences, Asians and Europeans may not markedly different histology and other aspects of myopia.

5. Any knowledge on the re-bound effect on atropin treatment? The ATOM 2 study reported, that 0.01% atropine resulted in a 60% risk of a refractive error rebound effect in children aged 8–10 years, compared to 30% at age 10-12 years and 8% after the age of 12 years. Chia A, Chua WH, Cheung YB, et al. Atropine for the treatment of childhood myopia: safety and efficacy of 0.5%, 0.1%, and 0.01% doses (atropine for the treatment of myopia 2). *Ophthalmology* 2012; 119: 347–354

6. Do one can expect a rebound effect after stopping to use Atropine drops? For how long these drops should be recommended? There is a dose dependent rebound effect of atropin. Based on the ATOM 2 study, which reported, that 0.01% atropine resulted in a 60% risk of a refractive error rebound effect in children aged 8–10 years, compared to 30% at age 10-12 years and 8% after the age of 12 years, there is recommendation from Chia (Chia A and Tay SA. Clinical management and control of myopia in children. In: Ang M and Wong TY (eds) *Updates on myopia. A clinical perspective*. 1st ed. Singapore: Springer, 2020, pp.187–200.), that in children younger than 12 years who showed no progression in the past year, atropine 0.01% may be slowly tapered by reducing drop frequency (by 1–2 days/week each year). However, if children are older than 12 years, then the frequency of eye drops could be tapered more quickly (by 1–2days/week every 6 months). Using this regime, most children will be off medication by about 14-15 years of age.

7. Role of Atropine in myopic astigmatism? The study by Chia et al (Chia A, Chua WH, Tan D. Effect of topical atropine on astigmatism. Br J Ophthalmol. 2009 Jun;93(6):799-802) shown that the use of atropine on a daily basis over 2 years did not have any clinically significant effect on astigmatism.
8. How do you stop atropine dose when myopia is stable? The withdrawal of atropin, there is recommendation from Chia (Chia A and Tay SA. Clinical management and control of myopia in children. In: Ang M and Wong TY (eds) *Updates on myopia. A clinical perspective*. 1st ed. Singapore: Springer, 2020, pp.187–200.), which based on the ATOM 2 study, which reported, that 0.01% atropine resulted in a 60% risk of a refractive error rebound effect in children aged 8–10 years, compared to 30% at age 10-12 years and 8% after the age of 12 years, so in children younger than 12 years who showed no progression in the past year, atropine 0.01% may be slowly tapered by reducing drop frequency (by 1–2 days/week each year). However, if children are older than 12 years, then the frequency of eye drops could be tapered more quickly (by 1–2days/week every 6 months). Using this regime, most children will be off medication by about 14-15 years of age
9. Also, what is the optimal time to start to use Atropine drops? At what myopia range or age of a child? This topic is discussed in the chapter Management of pre-myopes and Treatment duration in our paper: Németh J, et al. Update and guidance on management of myopia. European Society of Ophthalmology in cooperation with International Myopia Institute. Eur J Ophthalmol. 2021 May;31(3):853-883. Open access link: https://journals.sagepub.com/doi/full/10.1177/1120672121998960

10. Good afternoon, thank you for this webinar. As atropine is an off-label medication for myopia prevention, where could we find good quality, easy to understand, information for the parents? I'm currently using info from the AAO. AAO is certainly a good source. There are possibly some national resources depending on the country – in Poland for example the Foundation Ophthalmology 21 organized a website for parents: myopia.pl. It provides very reliable and update information about myopia prevention and control. You can possibly translate some materials into your own language.

11. In practice what is a usual dose of Atropine you prescribe at first and when you decide to switch to stronger doses? Higher dose atropin (cc:0.1-0.5%) could have unacceptable level of mydriasis (3,0 mm), but lower doses (0.01-0.025%) are not enough effective on axial length growth, so the best position is somewhere in between (cc: 0.05%). You can start the frequency of 1 drop /day. If there is a progression, you can increase the frequency and dose/cc of atropin.

12. Nowadays I am using 0.02% with good results, the question will be how to stop using atropine? Which will be the strategy? The withdrawal of atropin, there is recommendation from Chia (Chia A and Tay SA. Clinical management and control of myopia in children. In: Ang M and Wong TY (eds) *Updates on myopia. A clinical perspective*. 1st ed. Singapore: Springer, 2020, pp.187–200.), which based

on the ATOM 2 study, which reported, that 0.01% atropine resulted in a 60% risk of a refractive error rebound effect in children aged 8–10 years, compared to 30% at age 10-12 years and 8% after the age of 12 years, so in children younger than 12 years who showed no progression in the past year, atropine 0.01% may be slowly tapered by reducing drop frequency (by 1–2 days/week each year). However, if children are older than 12 years, then the frequency of eye drops could be tapered more quickly (by 1–2days/week every 6 months). Using this regime, most children will be off medication by about 14-15 years of age.

13. Atropine for pre-myopic children? This topic is discussed in the chapter Management of pre-myopes and Treatment duration in our paper: Németh J, et al. Update and guidance on management of myopia. European Society of Ophthalmology in cooperation with International Myopia Institute. Eur J Ophthalmol. 2021 May;31(3):853-883.

14. Dear colleagues, I have two questions. 1.consering myopia correction with contacts: What is your opinion considering soft lenses usage in progressive myopia? Is there role in Europe contacts Association not to use them in children younger than 15 years? If you thought that using single vision soft lens in case of high myopia, there is no evidence to use this type of lens for controlling myopia. But my opinion is, that the image resolution will be better using this lens type and there will be less blur on the retina, may be you can reach some results. A lot also depend on the age of the child. You can use contact lens in lower age group than 15 years. Sometimes contact lenses are used in case of infants for optical rehabilitation (for example aphakia).
    2. What is with remedias such as Arcavit and Difrarel because they were used 90's in progressive myopia!? Is there some close types of such as vitamins or others? There is no strong evidence to use of any type of nutritional supplements for myopia control.
15. Do semisoft or gas permeable contact lenses have any role in prevention of progression of Myopia? In India, these lenses have proved to prevent progression of myopia. In some studies, rigid gas permeable lenses were reported to slow myopia progression in children, but more recent, well-designed studies showed that the use of these lenses did not impact axial elongation and that the apparent control of myopia progression observed with RGPs was most likely induced by temporary corneal flattening.
16. Does atropine have a role in halting progression in syndromic myopia, such as Marfan's syndrome? Marfan syndrome is a connective tissue disorder, and the heart valves can be effected as well. So, the use of atropin can be dangerous in case of some syndromatic patients and can cause severe systematic side effects.
17. Good evening, recently examines a 4+ years old boy with cyclo Rx -1.25 sph -2.00 cyl x90 OU with retinoscopy! Should I give specs or wait and re-evaluate soon? VA almost uncorrected 5-6/10. There are charts (Klaver C, Polling JR and Erasmus Myopia Research Group. Myopia management, in the Netherlands. *Ophthalmic Physiol Opt* 2020; 40: 230–240., McCullogh Adamson G, Breslin KMM, et al. Axial growth and refractive change in white European children and young adults: predictive factors for myopia. *Sci Rep* 2020; 10: 15189.)

which give information about the risk of developing high myopia at older ages. You will need information about the axial length, and you can use these charts. It is very important to give the child the full correction with correcting the astigmatism perfectly. It is recommended to use special design with peripheral defocus correcting lenses (MyioSmart).

18. How to use atropine- 1 time in evening? You can start the frequency of 1 drop/day in evening. If there is a progression, you can increase the frequency and dose/cc of atropin.

19. What is the duration and regime of treatment and does it have systemic side effects? Higher dose atropin (cc: 0.1-0.5%) could have unacceptable level of mydriasis (3,0 mm), but lower doses (0.01-0.025%) are not enough effective on axial length growth, so the best position is somewhere in between (cc: 0.05%). You can start the frequency of 1 drop /day. If there is a progression, you can increase the frequency and dose/cc of atropin. If myopia still stable The withdrawal of atropin, there is recommendation from Chia (Chia A and Tay SA. Clinical management and control of myopia in children. In: Ang M and Wong TY (eds) *Updates on myopia. A clinical perspective*. 1st ed. Singapore: Springer, 2020, pp.187–200.), which based on the ATOM 2 study, which reported, that 0.01% atropine resulted in a 60% risk of a refractive error rebound effect in children aged 8–10 years, compared to 30% at age 10-12 years and 8% after the age of 12 years, so in children younger than 12 years who showed no progression in the past year, atropine 0.01% may be slowly tapered by reducing drop frequency (by 1–2 days/week each year). However, if children are older than 12 years, then the frequency of eye drops could be tapered more quickly (by 1–2days/week every 6 months). Using this regime, most children will be off medication by about 14-15 years of age. Systematic side effects include dry skin, mouth, and throat, drowsiness, restlessness, irritability, delirium, tachycardia and flushing of the face or neck two of the largest clinical trials of topical atropine, the ATOM1 and ATOM2 studies, none of the reported serious adverse events were thought to be associated with atropine and there have been no significant adverse systemic side effects. The side effects of atropin are dose dependent.