Special Article

Guidelines for Prescribing Optical Correction in Children

Sorot Wutthiphan MD*

* Priest Hospital

As the eye grows, the axial length increases while the cornea and lens flatten. High refractive errors which are common in the neonatal period, reduce rapidly during the first year of life through the process called emmetropization. The possibility that long term full- time glasses wear may impede emmetropization must be considered. Hyperopia greater than 5.00 diopters (D) in young children is associated with an increased risk of amblyopia and strabismus, therefore optical correction should be prescribed. When hyperopia is associated with esotropia, full correction of the cycloplegic refractive error should be prescribed. Myopia greater than 8.00 D and astigmatism greater than 2.50 D are common causes of isometropic amblyopia. Patients with hyperopic anisometropia with as little as l D difference between the eyes may develop amblyopia while the difference should reach 3-4 D for myopic anisometropia to develop amblyopia. Full cycloplegic refractive difference between two eyes should be given to the anisometropic child in spite of age, strabismus and degree of anisometropia. Myopia control is the attempt to slow the rate of progression of myopia such as cycloplegic agents, plus lenses at near, and rigid contact lenses.

Keywords: *Hyperopia, Myopia, Anisometropia, Astigmatism*

J Med Assoc Thai 2005; 88 (Suppl 9): S163-9
Full text. e-Journal: *http://www.medassocthai.org/journal*

Refractive error is a manifestation of the combination between the optical components of the eye (i.e., the curvatures, refractive indices, and distances between the cornea, aqueous, lens, and vitreous) and the axial length of the eye. As the eye grows, the axial length increases while the cornea and lens flatten. The axial length is approximately 16.8 mm. at birth and increases to about 23.6 mm. in adulthood[1]. The mean keratometry value is 51.2 diopters (D) in newborn and 43.5 D in adults[1]. The refractive power of the lens decreases from a mean of 34.4 diopters in the newborn to adult value of 18.8 diopters[1]. The anterior chamber deepens to reach the adult size by the end of the second year. These components change continuously as the eye grows but change abruptly during the first 2 years of life.

The mean refractive error of a full-term infant is +0.62 $\pm$ 2.24 D at birth[2]. The high standard deviation implies the wide range of refractive errors in newborns. The prevalence of refractive error among full-term infants has a normal bell-shaped distribution. A study showed that 75 % of full-term infants were hyperopic (+1 to +12 D) while 25% of infants were myopic (-1 to -12 D)[3]. The incidence of astigmatism is higher in the infant than adult group. In infants, 75 % have against-the-rule astigmatism, 21% have with-the-rule astigmatism and 8% have oblique astigmatism[4]. In adults, with-the-rule astigmatism predominates. The incidence of astigmatism decreases with advancing years, reaching adult levels from between 18 months to 3.5 years[5]. High refractive errors which are common in the neonatal period, reduce rapidly during the first year of life[5]. A shift from hypermetropia at birth to emmetropia in the adult indicates the process of emmetropization.

Correspondence to : Wutthiphan S, 57/47 Soi Ngamduplee, Rama 4 Rd, Sathorn, Bangkok 10120, Thailand. Phone: 0-2286-4252, 0-1361-1344

Emmetropization

Emmetropization is a mechanism to achieve emmetropia in youths and to maintain emmetropia with advancing years. This process is complete in 82% of full term infants by 12 months of age[6]. High hyperopia associated with high astigmatism suggests a breakdown in the process of emmetropization. Emmetropization is the combination of passive and active processes[7].

- The passive process occurs with normal growth of the eye. As the eyeball enlarges, the power of the cornea and the lens is reduced by lengthening of the radius of curvature. The proportional enlargement of the eye reduces the power of the dioptric system in proportion to the increasing axial length. When these changes are not proportional, ametropia develops. This passive emmetropization elucidates the maintenance of emmetropia in the growing eye.

- The active emmetropization explains the reduction towards emmetropia reported in infants and the maintenance of emmetropia. This mechanism involves the visual feedback mechanism from the retinal image and subsequent adjustment of the growth of the eye. Ametropia results when a defective image interferes with this feedback. Inheritance determines the tendency to definite globe proportions and environment plays a part in influencing the action of active emmetropization. Nevertheless, the environment possibly plays a greater role in influencing the development and degree of myopia than in hyperopia.

Preterm infants

While preterm infants tend to be more myopic and astigmatic at birth than the fullterm group, emmetropization also occurs in the preterm infants[8]. At term age, they do not differ from the fullterm group in astigmatism or anisometropia. Preterm children with retinopathy of prematurity (ROP) frequently fail to emmetropize, resulting in high refractive error, in particular myopia[9]. The impact of prematurity on refractive development when ROP is absent is controversial. Some authors have reported that preterm infants who do not have ROP have an increased risk of developing significant refractive errors, mostly myopia[10]. Others have found that preterm infants show a more normal pattern of refractive development[11].

Optical correction in children

Ametropia correction in children requires special considerations. The best corrected visual acuity is not the only goal of prescribing optical correction in children. Ophthalmologists must carefully consider to provide the focused retinal image and to maintain an optimal balance between accommodation and convergence when prescribing correction. The child's lack of cooperation with subjective refraction makes subjective refraction unpractical; therefore objective techniques such as retinoscopy can be used. Adequate cycloplegia is required to control the accommodation. Strabismus may alter general prescribing guidelines. The possibility that long term full time glasses wear may impede emmetropization must be considered.

Hyperopia

The prevalence and magnitude of hyperopia is greatest during early childhood, decreasing in the first decade of life through the process of emmetropization. Most infants have mild hyperopia, with only a small group of cases having moderate or high hyperopia. While emmetropization results in a gradual decrease in the magnitude of hyperopia in most children, the change occurs more rapidly in cases with high hyperopia. However, infants with high hyperopia are more likely to remain significantly hyperopic throughout childhood; and in young children with significant hyperopic astigmatism, especially against-the-rule astigmatism, the reduction in hyperopia is less than those without significant astigmatism[12]. Some children who do not go through the process of emmetropization, remain significantly hyperopic and have an increased risk for developing strabismus and amblyopia[13]. Children with moderate and high hyperopia are at particularly increased risk of refractive and strabismic amblyopia. Children who have +3.50 or more diopters of meridional hypermetropia show the benefit of decreased risk for strabismus and amblyopia from early optical correction[14]. However, a study in animals showed that early optical correction in young primates can impede with emmetropization[15]. Therefore the refractive error has the potential to persist following early spectacle lenses treatment[15]. However, partial spectacle correction of hyperopia in infant can reduce the risk of amblyopia and strabismus[16].

Uncorrected hyperopia may cause:

- Constant or intermittent blurred vision. Children with low to moderate hyperopia usually have normal visual acuity; they may have blurred vision and asthenopia when visual demands are high.
- Amblyopia. High hyperopia in young children is associated with an increased risk of amblyopia and strabismus[6]. A person who has never been optically corrected for high hyperopia (+5.00 D or more), with or without astigmatism, is at risk of isometropic amblyopia.
- Strabismus. The majority of patients with early-onset esotropia are hyperopic. Children who have +3.50 D or more in infancy were 13 times more likely to develop strabismus, and 6 times more likely to have reduced visual acuity by 4 years, compared with infants with low hyperopia or emmetropia[17]. Wearing a partial spectacle correction reduced these risk ratios to 4:1 and 2.5:1 respectively[17]. Infant refractive correction significantly reduces accommodative esotropia

and amblyopia incidence without interfering with emmetropization[18]. It has also been reported that hyperopia changes slowly in esotropic children provided with total optical correction[19]. In contrast, Ingram et al have showed that hyperopic children with strabismus fail to emmetropize whether they wear glasses or not[20]. Repka et al have reported that accommodative esotropes wearing full hyperopic correction are less likely to go through emmetropization[21]. Persons with esophoria and inadequate fusional divergence amplitude are often symptomatic as a result of the uncorrected hyperopia

- Asthenopia. Young individuals with hyperopia commonly have sufficient accommodative reserve to maintain clear vision without causing asthenopia. When the degree of hyperopia is too great or the accommodative reserve is insufficient due to age or fatigue, asthenopia and blurred vision develop.
- Accommodative dysfunction and binocular dysfunction. Uncorrected hyperopia may contribute to learning problems, possibly by optical blur, accommodative and binocular dysfunction, and fatigue.
- Red or tearing eyes, frequent blinking, squinting and facial contortions while reading, focusing problems, decreased binocularity and eye-hand coordination, and difficulty with or aversion to reading.

The presence and severity of these symptoms varies extensively, depending on the degree of the hyperopia, the presence of astigmatism or anisometropia, the patient s age, the condition of accommodation and convergence and the work demands. The early detection and treatment of significant hyperopia can prevent and reduce the incidence and severity of these complications.

In mentally and multiply handicapped children, the prevalence of significant hyperopia is higher than in normal children. The optical correction of their hyperopia is the same as other children.

General guidelines for childhood hyperopia

The precise correction of childhood hyperopia is more difficult than that of myopia. Children with significant hyperopia are more visually impaired than their myopic peers who can see clearly at near distances. The close association between childhood hyperopia, amblyopia, and strabismus, makes hyperopia a greater risk factor than myopia. Optical correction should be based on both static and cycloplegic retinoscopy, accommodative and binocular assessment, accommodative convergence/accommodation (AC/A) ratio, age, degree of symptoms, amount of hyperopia, visual acuity and the correction modified to facilitate binocularity and compliance. The goals of treatment are to reduce accommodative demand and to provide clear, comfortable vision and normal binocularity.

- Young children with low to moderate hyperopia generally require no treatment unless they do not have strabismus, amblyopia, or other significant vision problems.
- Optical correction should be prescribed for young children with moderate to high hyperopia. Any significant astigmatic errors should be fully corrected at the same time. Occlusion therapy should start in patients with amblyopia.
- Some young persons with hyperopia, including those with moderate and high hyperopia, may be rather free of signs and symptoms. If the optical correction is deferred, such persons should be considered “at risk” and re-examined periodically
- After optical correction has been worn for even a short time, a significant increase in hyperopia may appear due to the manifestation of latent hyperopia.
- In young children with isometropic amblyopia from bilateral high hyperopia, they typically do not manifest esotropia because they make no attempt to accommodate it. Partial optical correction may inadvertently stimulate accommodative esotropia, because the patient now can accommodate to overcome the remaining uncorrected hyperopia. Thus, full optical correction is indicated in this condition.
- When hyperopia is associated with esotropia, full correction of the cycloplegic refractive error should be prescribed. Later, reduction of the hyperopic correction should be attempted, based on the degree of deviation at distance and at near with the full cycloplegic correction in place. Accommodative esotropes may be able to discontinue glasses use as a result of increased fusional divergence amplitudes, the loss of hyperopia, or a decrease in the synkinesis between accommodation and convergence.
- Young children with accommodative esotropia, normally require only a short period of adaptation to tolerate full hyperopic correction. For some persons who do not initially tolerate the full hyperopic correction, using cycloplegic agents to blur uncorrected vision may encourage acceptance of the prescribed treatment.
- In a school-age child, full hyperopic correction may create blurred distant vision because of the child’s inability to relax accommodation completely. For the child without esotropia, the reduction in the

quantity of correction may facilitate the acceptance of the glasses.

- Hyperopic contact lenses can relax accommodation more effectively than spectacles. In accommodative esotropia, contact lenses reduce and eliminate esotropia at near to a greater extent than spectacles. Contact lenses reduce aniseikonia and anisophoria in persons with anisometropia, improving binocularity.

Myopia

The prevalence of myopia is less than 5% in the 5-year-old population, increasing to 20-25 % in teenagers and 25-35 % in adults. It is reported to be higher in Asia. The prevalence of myopia increases with income level, more years of education, and greater time spent doing near work. A family history of myopia is an important risk factor for the development of myopia.

Myopia in infants tends to decrease and reach emmetropia by 2-3 years of age. Myopia of as much as 3 D will sometimes disappears by 2 years of age[22]. The presence of myopia in infancy that subsequently decreases to emmetropia before the child enters school appears to be a risk factor for the later development of myopia[22]. Children with refractive errors in the range of emmetropia to +0.50 D are more likely to become myopic than the same age children who have hyperopia more than +0.50 D. The risk for myopia is higher in children who have against-the-rule astigmatism.

Pseudomyopia is the result of an increase in ocular refractive power due to overstimulation of accommodation or ciliary spasm.

In children, conditions that prevent normal image formation (e.g., eyelid hemangiomas, neonatal eyelid closure, corneal opacity, ROP and vitreous hemorrhage) often result in myopia. The progression of childhood myopia usually slows down in the middle to late teenage years. Studies in animals have shown that a defocus of retinal image induces myopia by stimulating an elongation of the vitreous chamber[15].

Uncorrected myopia may cause

- Blurred vision. The most common symptom associated with uncorrected myopia is blurred distance vision. In pseudomyopia, the blurred distance vision may be greater following near work.
- Asthenopia. Asthenopia is not characteristic of myopia. If asthenopia is associated with myopia, it is usually due to astigmatism, anisometropia, pseudomyopia, accommodative or vergence dysfunction.
- Amblyopia. Myopia greater than 8.00 D can cause isometropic amblyopia.

General guidelines for childhood myopia

- Cycloplegic refractions are necessary. Atropine refractions may be required in infants, esotropic children and person with high myopia (> 10 D).
- It is not necessary to correct myopia of less than about 3 D in infants and toddlers. In preschool children, myopia of more than 1.00-2.00 D can be prescribed. If the myopia is left uncorrected, the child should be examined every 6 months. When myopia reaches a higher degree and makes distance viewing more difficult, optical correction should be given.
- Before prescribing lenses, an alternative for the patient with very low ametropia is to try to improve the visual environment, such as moving the child toward the front of the room.
- Generally, full refractive error including cylinder, should be corrected. Young children tolerate cylinder well. A careful subjective refraction should be performed to determine the lowest minus lens power that achieves the best visual acuity. Some ophthalmologists undercorrect myopia, and others may even use bifocals with or without atropine, on the theory that prolonged accommodation hastens the development of myopia. However, this theory is controversial.
- Patients with low myopia and insignificant astigmatism or anisometropia, can remove their glasses for reading, especially if they have esophoria at near or have a high lag in accommodation.
- In cases of esophoria at near or accommodative insufficiency, a plus lens addition for near may relieve asthenopia and improve near vision efficiency.
- Intentional undercorrection of myopia to decrease the angle of esotropia is seldom tolerated.
- In cases of large exophoria or intermittent exotropia, a prescription for full-time wear of the full myopia correction is suitable. Intentional overcorrection of myopia may have some benefit to control an intermittent exodeviation.
- Bifocal should be fit slightly higher in non-presbyopic than in presbyopic patients.
- Pseudomyopia occasionally results from high exophoria as a means of maintaining fusion through accommodative convergence. The goal of treatment for pseudomyopia is to relax the accommodation by using a cycloplegic agent and near plus lens addition
- Contact lenses may be an alternative to expand the visual field, provide a larger retinal image

size and reduce the possibility of induced prismatic imbalance from the tilt of the spectacle frame. Myopic contact lenses require more accommodation than spectacle lenses, resulting in the risk of nearpoint blur and eyestrain in high myopia. Contact lenses result in less aniseikonia in anisometropia.

Control of Myopia

Myopia control is the attempt to slow the rate of progression of myopia.

- Cycloplegic agents

Studies have reported that daily topical administration of atropine and cyclopentolate reduces myopia progression rates in children[23]. Nevertheless, this advantage does not outweigh the discomfort, toxicity and risks associated with chronic cycloplegia. In addition, high plus lens additions (i.e., 2.50 D) are required for near vision due to the inactivation of the ciliary muscle.

- Plus at Near

The effectiveness of bifocal lenses for myopia control in children is controversial, some studies found no statistically significant reduction in myopia progression[24], whereas others found that bifocals controlled myopia[25]. The most effective power of the near addition is debatable. The near add powers of about 1.00 D appear to be as effective or more effective than higher power adds[25].

- Rigid Contact Lenses

Rigid gas-permeable contact lenses have been reported effective in slowing the rate of myopia progression in children[26]. Myopia control is believed to be due to corneal flattening. During 3 years of the contact lenses treatment, the vitreous chamber still continued to elongate, therefore the control of myopia with rigid contact lenses would not reduce the risk of developing myopic posterior segment sequelae. When contact lens wear is discontinued, there appears to be a rebound effect (i.e., resteepening of the cornea).

Orthokeratology is the programmed fitting of a series of contact lenses, over a period of weeks or months, to flatten the cornea and reduce myopia. Most of this myopic reduction occurs within the first 4-6 months. However, the refractive error shifts toward the original baseline in patients who stop wearing contact lenses.

- Visual Hygiene

Although there is no evidence that visual hygiene is effective in myopia control, this recommendation appears useful.

- When reading or doing intensive near work, take a break about every 30 minutes. During the break, stand up and look out a window.
- When reading, maintain proper distance from the book. The book should be at least as far from your eyes as your elbow when you make a fist and hold it against your nose.
- Sufficient illumination for reading.
- Avoid glare on the page by using a diffuse light source and allowing it to shine on the page from behind you (over your shoulder), rather than shining or reflecting toward you.
- Read or do other visual work using a relaxed upright posture.
- Place a limit on the time spent watching television and video games. Sit 5-6 feet away from the television.

Astigmatism

Astigmatism, the most common refractive error, is often present with hyperopia. Astigmatism greater than 2.50 D can cause isometropic amblyopia. Compound hyperopic astigmatism, especially oblique or against-the-rule astigmatism, causes correspondingly more visual problems than simple hyperopia of equal amount. In compound astigmatism, some cylinder correction should be incorporated in the prescription when the amount of astigmatism is 0.50 D or greater. If the patient has successfully worn a correction with 0.25 D cylinder, cylinder correction of as little as 0.25 D can be incorporated in the new prescription.

Anisometropia

The presence of anisometropic hyperopia during infancy and persisting anisometropic hyperopia beyond 3 years of age are risk factors for the development of strabismus and amblyopia. The person with hyperopic anisometropia uses the less hyperopic eye for fixation at all distances, the more hyperopic eye never receives a clear image, resulting in amblyopia. Patients with hyperopic anisometropia with as little as 1 D difference between the eyes may develop amblyopia, while those with myopic anisometropia will develop amblyopia when the amount of anisometropia reaches 3-4 D. The patient with myopic anisometropia uses the more myopic eye at near and the less myopic eye at far until the myopia exceeds 3 D, thereby maintaining good corrected acuity in each eye. Full cycloplegic refractive difference between two eyes should be given to the anisometropic child in spite of age, strabismus and degree of anisometropia. A few patients, especially adults, may need to begin with less than the full anisometropic prescription to avoid diplopia and ensure acceptance of the correction.

References

1. Gordon RA, Donzis PB. Refractive development of the human eye. Arch Ophthalmol 1985; 103: 785-9.
2. Goldschmidt E. Refraction in the newborn. Acta Ophthalmol 1969; 47: 570-8.
3. Cook RC, Glasscock RE. Refractive and ocular findings in the newborn. Am J Ophthalmol 1951; 34: 1407-13.
4. Fulton AB, Dobson V, Salem D, Mar C, Petersen RA, Hansen RM. Cycloplegic refractions in infants and young children. Am J Ophthalmol 1980; 90: 239-47.
5. Saunders KJ. Early refractive development in humans. Surv Ophthalmol 1995; 40: 207-16.
6. Ingram RM, Arnold PE, Dally S, Lucas J. Emmetropisation, squint, and reduced visual acuity after treatment. Br J Ophthalmol 1991; 75: 414-6.
7. Brown NP, Koretz JF, Bron AJ. The development and maintenance of emmetropia. Eye 1999;13: 83-92.
8. Saunders KJ, McCulloch DL, Shepherd AJ, Wilkinson AG. Emmetropisation following preterm birth. Br J Ophthalmol 2002; 86: 1035-40.
9. Robinson R, O'Keefe M. Follow-up study on premature infants with and without retinopathy of prematurity. Br J Ophthalmol 1993; 77: 91-4.
10. Holmstrom G, el Azazi M, Kugelberg U. Ophthalmological long term follow up of preterm infants: a population based, prospective study of the refraction and its development. Br J Ophthalmol 1998; 82: 1265-71.
11. Pennefather PM, Tin W, Strong NP, Clarke MP, Dutton J, Cottrell DG. Refractive errors in children born before 32 weeks gestation. Eye 1997; 11: 736-43.
12. Atkinson J. Infant vision screening: prediction and prevention of strabismus and amblyopia from refractive screening in the Cambridge Photorefraction Program. In: Simons K, editor. Early visual development normal and abnormal. New York: Oxford University Press, 1993: 335-48.
13. Aurell E, Norrsell K. A longitudinal study of children with family history of strabismus: factors determining the incidence of strabismus. Br J Ophthalmol 1990; 74: 589-94.
14. Ingram RM, Walker C, Wilson JM, Arnold PE, Dally S. Prediction of amblyopia and squint by means of refraction at age 1 year. Br J Ophthalmol 1986; 70: 12-5.
15. Hung LF, Crawford ML, Smith EL. Spectacle lenses alter eye growth and the refractive status of young monkeys. Nature Med 1995; 1: 761-5.
16. Ingram R, Arnold P, Dally S, Lucas J. The results of a randomized trial of treating abnormal hypermetropia from the age of 6 months. Br J Ophthalmol 1990; 74: 158-9.
17. Atkinson J, Braddick O, Bobier B, Anker S, Ehrlich D, King J, et al. Two infant vision screening programs: prediction and prevention of strabismus and amblyopia from photo and videorefractive screening. Eye 1996; 10: 189-98.
18. Simons K. Amblyopia characterization, treatment, and prophylaxis. Surv Ophthalmol 2005; 50: 123-66.
19. Paris V, Andris C, Moutschen A. Benefits of total hypermetropia correction in patients with strabismus. Bull Soc Belge Ophtalmol 1995; 259: 143-53.
20. Ingram RM, Gill LE, Lambert TW. Effect of spectacles on changes of spherical hypermetropia in infants who did, and did not, have strabismus. Br J Ophthalmol 2000; 84: 324-6.
21. Repka MX, Wellish K, Wisnicki HJ, Guyton DL. Changes in the refractive error of 94 spectacle-treated patients with acquired accommodative esotropia. Binoc Vis 1989; 4: 5-21.
22. Gwiazda J, Thorn F, Bauer J, Held R. Emmetropization and the progression of manifest refraction in children followed from infancy to puberty. Clin Vis Sci 1993; 8: 337-44.
23. Yen MY, Liu JH, Kao SC, Shiao CH. Comparison of the effect of atropine and cyclopentolate on myopia. Ann Ophthalmol 1989; 21: 180-7.
24. P rssinen O, Heminki E, Klemetti A. Effect of spectacle use and accommodation on myopia progression: final results of a three-year randomized clinical trial among schoolchildren. Br J Ophthalmol 1989; 73: 547-51.
25. Roberts WL, Banford RD. Evaluation of bifocal correction technique in juvenile myopia. Optom Weekly 1967; 58: 25-8; 58: 21-30; 58: 23-8; 58: 27-34; 58: 19-26.
26. Perrigin J, Perrigin D, Quintero S, Grosvenor T. Silicone-acrylate contact lenses for myopia control: 3-year results. Optom Vis Sci 1990; 67: 764-9

แนวทางการให้แว่นสำหรับสายตาที่ผิดปรกติในเด็ก

โสพส วุฒิพันธุ์

ในการเจริญเติบโตของตานั้นพบว่าความยาวของลูกตาจะยาวขึ้นแต่กระจกตาและเลนส์ตาจะแบนลง ในเด็กเล็กส่วนใหญ่จะมีสายตาที่ผิดปรกติซึ่งจะลดลงเรื่อย ๆ เมื่อโตขึ้น การเปลี่ยนแปลงอันนี้เกิดขึ้นอย่างมากใน 1 ปีแรกของชีวิตโดยผ่านกระบวนการ emmetropization การให้แว่นสายตาแก่เด็กเล็กที่สายตายังอยู่ในการพัฒนาอาจรบกวนกระบวนการนี้ทำให้สายตาที่ผิดปรกตินี้ไม่ลดลงตามที่ควรเป็น เด็กเล็กที่มีสายตายาวมากกว่า 5.00 D มีโอกาสเกิดตาขี้เกียจและตาเขได้สูงจึงควรใส่แว่นเพื่อป้องกัน ในกรณีที่สายตายาวพบร่วมกับตาเขเข้าต้องให้แว่นเต็มที่เท่ากับที่วัดได้จาก cycloplegic refraction สายตาสั้นมากกว่า 8.00 D และสายตาเอียงมากกว่า 2.50 D เป็นสาเหตุของตาขี้เกียจ สายตายาวที่ต่างกันเพียง l D ในสองตาสามารถทำให้เกิดตาขี้เกียจได้ขณะที่สายตาสั้น ต้องต่างกันมากกว่า 3-4 D จึงจะเกิดตาขี้เกียจ ส่วนต่างของสายตานี้ควรประกอบอยู่ในแว่นเสมอโดยไม่คำนึงถึงอายุ ตาเขหรือจำนวนของส่วนต่าง ได้มีการพยายามลดการเพิ่มสายตาสั้นได้แก่ การใช้ยา cycloplegic agents การเพิ่มเลนส์บวกที่ใกล้ การใส่ contact lenses ชนิดแข็ง