

Position Paper on Children and Contact Lenses

For Optometrists and the Lay Public*

From the Section on Cornea and Contact Lenses of the American Academy of Optometry

Who are the children discussed in this paper?

This paper is intended for children of all ages who may benefit from contact lens wear and their parents. Infants just a few months old who need vision correction may benefit from contact lens wear as much as nearsighted teenage children.

What are the primary indications for contact lens wear in children?

An infant or toddler is typically fitted with contact lenses because he or she had cataracts (clouding of the lens inside the eye) removed just after birth or because of an eye injury. Older children are typically fitted with contact lenses because they are nearsighted (difficulty seeing far away) or farsighted (difficulty seeing up close). Children may also wear contact lenses to mask disfigured eyes, to patch an eye during vision therapy, or to change the color of the eyes.

What are gas permeable contact lenses?

Gas permeable contact lenses are typically smaller than the colored part of the eye (the iris). They are flexible, but they do not fold in half. Gas permeable contact lenses can be removed and cleaned daily, or they may be worn continuously for up to 30 days and nights. These are sometimes referred to as "rigid gas permeable lenses."

What are soft contact lenses?

Soft contact lenses are bigger than the iris. They are extremely flexible, and they can be folded in half. Soft contact lenses can be worn continuously for up to 30 days and nights, may be removed and cleaned daily then disposed every two weeks to three months, may be removed and cleaned daily and maintained for approximately one year, or they may be removed and disposed daily, depending on the specific soft contact lens prescribed.

What type of contact lenses correct refractive error?

Refractive error results when the optics of the eye does not properly focus light on the retina (the seeing part inside of the eye). Refractive error is specified by the glasses prescription. Nearsightedness is a condition in which light focuses in front of the retina and people have difficulty viewing objects that are far away. When children enter elementary school approximately 2% of them are nearsighted, but by the time children enter high school approximately 15% are nearsighted.¹ Farsightedness is a condition in which the light focuses behind the retina, and people have difficulty seeing close objects. While most children are farsighted, most far sighted children do not require vision correction to see clearly. Astigmatism results when the light focuses in two different points. Astigmatism is present in two-fifths of children prior to school age,² but it typically decreases with age so only 10% of adults have visually significant astigmatism.³ Anisometropia is defined as a significant difference in refractive error between the two eyes, which can result in a variety of visual problems. Approximately 3% of children have anisometropia.⁴ All of these conditions can be corrected with contact lenses. Children are typically fitted with glasses first, but some children will not tolerate glasses. Contact lenses are another treatment option to provide children with optimal vision. Both gas permeable and soft contact lenses are appropriate for all of these conditions. Gas

permeable and soft contact lenses are available to correct nearsightedness and farsightedness. The contact lens type that should be prescribed should be determined by the optometrist and the parent. The key issues that should be addressed are: the prescription needed, how often the child wants to wear contact lenses, the child's activities, the parents' experience with contact lenses, and the child's visual needs.

What is aphakia and what types of contact lenses correct aphakia?

When the crystalline lens inside the eye is removed due to cataracts and not replaced, the resulting condition is called "aphakia." The crystalline lens is removed when a cataract obscures the child's vision. In adults, the crystalline lens is replaced with an artificial lens in the eye. A child's eye grows rapidly during the first two years. Placing an artificial lens in a child's eye only provides temporary vision correction because the artificial lens cannot compensate for the growing eye. As the eye grows the glasses' prescription changes. An aphakic child is very farsighted. Contact lenses correct the farsightedness, and the power can be changed readily to compensate for the growing eye. Aphakic children can wear gas permeable or soft contact lenses, depending on the eye care practitioner's and the parents' choice. The contact lenses can be inserted and removed daily, or they can be worn for one week to one month at a time. The child may be fitted with contact lenses the day of the cataract surgery or very soon thereafter. The child should not be without vision correction for more than two to three weeks because the child may suffer permanent vision loss, a condition called "amblyopia" or "lazy eye."

What are prosthetic contact lenses and what do they correct?

Prosthetic contact lenses are colored contact lenses that mask a disfigured eye or reduce the amount of light that reaches the back of the eye. Eyes can become disfigured following an injury, an infection, or a variety of eye problems. Contact lenses may be used to match the other eye so that the problem is not as noticeable. Prosthetic contact lenses can be matched to the healthy eye from a pre-made set of contact lenses, or they can be custom painted to match the unaffected eye. Prosthetic contact lenses can correct poor vision with a prescription, or they can be completely colored for eyes that can no longer see. Prosthetic contact lenses can also reduce the amount of light that enters the eye to lessen glare or light sensitivity. These contact lenses help people with albinism (a condition in which the person lacks pigment and may be very sensitive to light) and iris problems. Prosthetic contact lenses may also be fitted on children with nystagmus (involuntary shaking of the eyes). Gas permeable contact lenses mask the appearance of the quivering eye, and the contact lenses may decrease the shaking of the eye and improve vision. Prosthetic contact lenses can be gas permeable or soft. Contact lenses that mask a disfigured eye or reduce the amount of light that enters the eye to lessen glare or sensitivity to light are usually soft due to the larger size and decreased movement of the contact lens.

How can contact lenses help with vision therapy?

When one eye has poor vision, the fellow eye is used to view objects. If one eye is not routinely used, it can develop amblyopia or "lazy eye" (permanent vision loss). In order to force the child to use an eye that cannot see properly, the good eye must be patched for several hours each day. Because the child is forced to see with an eye that does not see well, the child may not tolerate wearing an eye patch on the good eye. If the child repeatedly removes an eye patch, the child may be fitted with a contact lens that is worn for several hours every day. The contact lens may blur the child's vision in the good eye by prescribing too much power in the lens, or the contact

lens may be painted black. Some children who do not tolerate wearing an eye patch may tolerate these occluder contact lenses.⁵

At what age can a child wear contact lenses?

Children eight years and older can successfully wear gas permeable contact lenses⁶ and soft contact lenses^{7,8} independent of parents' aid. Children younger than eight years often require help with contact lens wear, but they can also be very successful contact lens wearers. They will typically require parental assistance with insertion and removal as well as care of the contact lenses. If a child was fitted at a very young age, he or she may be able to care for the contact lenses without help from parents before the age of seven years.

What are the advantages of gas permeable contact lenses?

Gas permeable contact lenses typically allow more oxygen to directly reach the anterior surface of the eye (the cornea) than soft contact lenses. They decrease the potential for complications due to insufficient oxygen such as corneal thickening, and damage to the front surface of the cornea.⁹ Although serious complications due to infection are rare for all types of contact lens wearers, gas permeable contact lens wearers are less likely to suffer from a corneal ulcer.¹⁰

Whereas soft contact lenses conform to the shape of the cornea, gas permeable contact lenses provide a smooth surface at the front of the eye and correct lower amounts of astigmatism, and they can correct an irregular cornea. Gas permeable contact lenses also correct optical aberrations (slight disturbances of vision) better than spectacles and soft contact lenses,¹¹ therefore they provide better visual performance for many individuals.

Gas permeable contact lenses are smaller and they do not fold as much as soft contact lenses. The contact time with the fingers on the eye during insertion or removal of a gas permeable contact lens is also less than with a soft contact lens. For that reason, gas permeable contact lenses are initially easier to insert and remove than soft contact lenses for the majority of patients.

Gas permeable contact lenses may slow the progression of nearsightedness in children.¹²⁻¹⁵ Five studies have compared annual myopic progression rates of gas permeable contact lens wearers to spectacle wearers, and three of them show at least a 40% reduction in myopia progression for gas permeable contact lens wearers.

What are the disadvantages of gas permeable contact lenses?

Gas permeable contact lenses initially cause greater discomfort than soft contact lenses, and this relative discomfort may continue over an extended period of time.¹⁶ Only one out of every five myopic children between the ages of eight and eleven years cannot adapt to gas permeable contact lens wear due to discomfort. A similar percentage of adults were not able to adapt to gas permeable gas permeable contact lens wear due to discomfort.¹⁷

Due to their small size and stiff shape, gas permeable contact lenses may move off the center of the eye more often than soft contact lenses. If gas permeable contact lenses are worn only occasionally, they may never be completely comfortable because the patient may never completely adapt to gas permeable contact lens wear. Gas permeable contact lenses may also get

dust or other particles under them, which may cause discomfort. Gas permeable contact lenses are not available in the frequent replacement modality, so a spare pair must be purchased in order to have back-up contact lenses. Gas permeable contact lenses are custom made for each patient; therefore they can rarely be dispensed the day of the contact lens fitting.

What are the advantages of soft contact lenses?

Soft contact lenses are initially more comfortable than gas permeable contact lenses, and they may continue to be more comfortable over an extended period of time.¹⁶ Most patients are fitted with soft contact lenses because of the initial comfort and because soft contact lenses can be dispensed to the patient at the initial fitting. Parents are more comfortable helping their children with contact lenses that are similar to their own contact lenses; therefore many parents will prefer that their children wear soft contact lenses.

Soft contact lenses can be prescribed in a frequent replacement program, so fresh contact lenses are always available to the child. This promotes better health and it provides several pairs of spare contact lenses in case of loss or damage to the contact lens. Daily disposable contact lenses do not require any cleaning or any contact lens solutions, so the care of the contact lenses is eliminated.

Soft contact lenses are bigger than gas permeable contact lenses, so they stay in place on the eye better than gas permeable contact lenses. Soft contact lenses are also less likely to get dust particles behind the lens, which can be uncomfortable.

What are the disadvantages of soft contact lenses?

Soft contact lenses are very flimsy and may be more difficult for children to handle initially. They are also bigger than gas permeable contact lenses and may be more difficult to place correctly on the eye. It takes greater contact time with the fingers on the eye to insert or to remove soft contact lenses from the eye.

Soft contact lenses drape over the eye, so they do not correct small amounts of astigmatism or corneas that are irregular after injury. Toric soft contact lenses can be fitted to correct for astigmatism, but they cannot correct vision problems due to irregular corneas.

Most soft contact lenses allow less oxygen to reach the eye than gas permeable contact lenses, so they may not be as healthy to wear as gas permeable contact lenses. However, new soft contact lens materials provide as much oxygen to the eye as gas permeable contact lenses. Soft contact lens wearers are also more likely to experience eye infections than gas permeable contact lens wearers, especially if the contact lenses are worn during sleep.

Who should consider wearing gas permeable contact lenses, and who should consider wearing soft contact lenses?

Children who plan to wear contact lenses nearly every day are the best candidates for gas permeable contact lens wear. Occasional contact lens wear does not allow the child to completely adapt to gas permeable contact lenses. Parents who want to slow the progression of their child's nearsightedness should seek gas permeable contact lenses¹²⁻¹⁵ rather than soft contact

lens wear.⁸ Children whose eye was injured will probably benefit from gas permeable contact lens wear because they correct vision problems caused by irregular corneas following trauma.

Children who desire to wear contact lenses occasionally or in dusty environments (softball, baseball, horseback riding, etc.) should consider wearing soft contact lenses instead of gas permeable contact lenses. Soft contact lenses are easier to adapt to, they are less likely to become dislodged, and they do not get debris behind the lens as easily as gas permeable contact lenses.

For most types of refractive error, both gas permeable and soft contact lenses are appropriate. Decisions should be made on the parents' preference and the doctor's advice.

What type of care systems should be used with children?

The easier a contact lens care system is to understand, the more likely a child will be compliant. Multi-purpose contact lens solutions are optimal for children. They are easy to explain to the child, and they are easy for the child to use. Daily disposable contact lenses are the easiest contact lenses to care for because they do not require cleaning or additional solutions.

Can a child wear contact lenses for 30 continuous days and nights?

Children have the option of wearing contact lenses for 30 continuous days and nights if their optometrist thinks it is advisable, but they should first wear the contact lenses on a daily wear basis. Inserting and removing the contact lenses daily provides them with the experience of caring for their contact lenses. A child who does not gain this experience will have greater difficulty should a problem arise unexpectedly.

The American Academy of Optometry's Position on Children and Gas Permeable Contact Lenses

Children are capable of wearing contact lenses to correct a variety of eye problems. Children as young as a few months are able to wear contact lenses with considerable help from parents and eye care practitioners. At approximately eight years of age, children are able to insert and remove contact lenses independently, and they are able to accept the responsibility of contact lens care without help from parents. A few contact lenses specifically made for children are available, but after two years of age, children are often able to wear contact lenses that are typically dispensed to adults.

Corneal reshaping (orthokeratology) can also be prescribed for children. The American Academy of Optometry's position paper on orthokeratology provides information on this topic.

** This report is furnished for general information purposes only. It does not constitute the practice of optometry or medicine, nor should it be relied upon for dealing with a specific, individual medical or health condition. Please consult a qualified eye care professional for advice about a specific condition.*

References

1. Sperduto RD, Seigel D, Roberts J, Rowland M. Prevalence of myopia in the United States. Arch Ophthalmol 1983; 101:405-7.
2. Mohindra I, Held R, Gwiazda J, Brill J. Astigmatism in infants. Science 1978; 202:329-31.

3. Attebo K, Ivers RQ, Mitchell P. Refractive errors in an older population: the Blue Mountains Eye Study. *Ophthalmology* 1999; 106:1066-72.
4. Fern KD, Manny RE, Garza R. Screening for anisometropia in preschool children. *Optom Vis Sci* 1998; 75:407-23.
5. Joslin CE, McMahon TT, Kaufman LM. The effectiveness of occluder contact lenses in improving occlusion compliance in patients that have failed traditional occlusion therapy. *Optom Vis Sci* 2002; 79:376-80.
6. Walline JJ, Mutti DO, Jones LA, Rah MJ, Nichols KK, Watson R, Zadnik K. The Contact Lens and Myopia Progression (CLAMP) Study: design and baseline data. *Optom Vis Sci* 2001;78:223-33.
7. Soni PS, Horner DG, Jimenez L, Ross J, Rounds J. Will young children comply and follow instructions to successfully wear soft contact lenses? *CLAO J* 1995; 21:86-92.
8. Horner DG, Soni PS, Salmon TO, Swartz TS. Myopia progression in adolescent wearers of soft contact lenses and spectacles. *Optom Vis Sci* 1999; 76:474-9.
9. Key J. Are hard lenses superior to soft? Arguments in favor of hard lenses. *Cornea* 1990; 9:9-11.
10. MacRae S, Herman C, Stulting D, Lippman R, Whipple D, Cohen E, Egan D, Wilkinson C, Scott C, et al. Corneal ulcer and adverse reaction rates in premarket contact lens studies. *Am J Ophthalmol* 1991; 111:457-65.
11. Hong X, Himebaugh N, Thibos L. On-eye evaluation of optical performance of gas permeable and soft contact lenses. *Optom Vis Sci* 2001; 78:872-80.
12. Stone J. The possible influence of contact lenses on myopia. *Br J Physiol Opt* 1976; 31:89-114.
13. 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.
14. Khoo CY, Chong J, Rajan U. A 3-year study on the effect of RGP contact lenses on myopic children. *Singapore Med J* 1999; 40:230-7.
15. Levy B. The effect of RGP lenses on the progression of myopia in a pediatric population in Singapore. In: *The Annual American Academy of Optometry Meeting*; 2001 December 8, 2001; Philadelphia, PA; 2001.
16. Fonn D, Gauthier CA, Pritchard N. Patient preferences and comparative ocular responses to gas permeable and soft contact lenses. *Optom Vis Sci* 1995; 72:857-63.
17. Polse KA, Graham AD, Fusaro RE, Gan CM, Rivera RK, Chan JS, McNamara NA, Sanders TS. Predicting RGP daily wear success. *CLAO J* 1999; 25:152-8.

Adopted June, 2004 by the American Academy of Optometry