

**American Academy of Optometry**  
**Section on Cornea, Contact Lenses and Refractive Technologies**  
**Position Paper on Monovision**  
**For Eye Care Practitioners and the Public\***

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**What is monovision?**

Monovision refers to the vision correction practice of prescribing distance vision in one eye and near vision in the other eye. This situation is usually created by applying contact lenses to the eyes or performing refractive eye surgery. The principal benefit of monovision is that it allows an individual to see clearly at two primary distances without the use of spectacles. The condition that precipitates the need for a monovision approach is called presbyopia, the age-related reduction in the focusing ability of the eyes.

**How does monovision work?**

Our brain is constantly processing information from our senses. At one instant, we might be aware of the temperature in the room, the softness of the chair we are sitting in, noises outside and a scent from the kitchen. Visual information is processed as well. Prior to the onset of presbyopia, accommodation allows the eye to change its focus so that the object of our interest and attention is clear, while those objects at any other distance are blurred; our brain then gives attention to the clear object in which we are interested.

In monovision, a person must learn to attend to visual input depending on the focal distance of the object of regard. In some individuals, this occurs almost automatically. In most who proceed with the treatment, there is a time of adjustment of one to two weeks.<sup>1</sup> As in most vision correction options, there are some individuals who will not adjust to monovision.<sup>2</sup>

## **Why consider monovision?**

A person becomes aware of being presbyopic when they can no longer focus on small items or on print at close distances. Traditional treatment for presbyopia includes using single-power reading glasses or multifocal spectacle lenses (e.g., bifocals).<sup>3</sup> In each of these methods, a correction is employed for near vision that is different from that used for distance vision. Reading glasses must be removed in order to view distant objects clearly. Alternatively, lenses with multiple focal lengths require the wearer to view through specific areas of the lens in order to match the focal length with the viewing distance. In each of these methods, a person is able to use both eyes in a coordinated fashion as each eye is focused for the same distance. Although theoretically ideal, having multiple focal lengths available and coordinated for both eyes has presented significantly greater challenges in contact lens design and fitting than it has in spectacle manufacturing and fitting. Monovision corrects presbyopia using single focus contact lenses to create a different focusing responsibility for each eye. This is accomplished differently depending on the situation.

Monovision also has a high success rate, being reported between 70 to 76%<sup>2,4</sup> with the success rate dependent upon the ability of the brain to suppress blur from the defocused eye.<sup>5</sup> The advantages of monovision include ease of fitting, changing one contact lens for present wearers, uninterrupted vision out of each eye separately, avoiding some of the vision and glare related problems resulting from the effect of varying pupil size on multifocal contact lens performance and less expense to patient and practitioner.<sup>6,7</sup>

## **How is monovision accomplished?**

In prescribing monovision, an eye care practitioner will first determine which eye should be corrected for distance tasks and which eye should be corrected for near tasks. Although a variety of approaches have been proposed, the most popular method, selected in as high as 95% of patients, is to determine the dominant or sighting eye and correct it for distance.<sup>2,8</sup>

There are some special instances in which a contact lens might be applied to only one eye to achieve a monovision effect. In the case of an individual with naturally good far vision but reduced

near vision from presbyopia, applying one near focus lens may be all that is needed. A patient with a natural level of nearsightedness that allows for good near vision might have one eye fitted with a contact lens that provides excellent far vision. The majority of monovision patients require some refractive correction for each eye. It is the task of the eye care practitioner to determine the optimum corrective balance. A contact lens is applied to one eye to provide maximum clarity for distances of 10 feet (3 meters) and beyond. A lens is applied to the other eye to provide maximum clarity for a distance of approximately 14-20 inches (35–50 centimeters). In managing patients fitted with contact lenses for monovision correction, it is not uncommon to modify the power of the lenses used to maximize the success of the treatment once the patient starts wearing the contact lenses. In some cases, it may even be necessary to change the eye that is focused for distance or use a bifocal or multifocal contact lens to improve patient satisfaction with their vision.<sup>8</sup>

Because refractive surgery is an irreversible procedure, it is imperative to consider the effects of presbyopia in all prospective patients, regardless of age. Current refractive procedures are not capable of producing a true multifocal effect. For this reason, monovision is often offered as an option for individuals contemplating refractive surgery.<sup>9</sup> It is generally suggested that a trial of contact lenses in a monovision mode precede surgical correction. When surgery is performed, the desired outcome is typically the same as that for monovision contact lens correction; however, it should be remembered that the patient's need for additional near correction is likely to change again with age.

### **Testing procedures and prescribing considerations**

During the testing process, a simulated monovision environment should be demonstrated to patients by placing the appropriate amount of plus power in front of the “near” eye and allow the patient to initially experience the monovision effect. Patients who have unilateral amblyopia (permanently reduced vision), if mild, should utilize the eye having better vision for distance. It is important that binocular vision tests are performed to determine the effect of monovision on

stereopsis as monovision is very likely to reduce depth perception. Although full adaptation to monovision may take two to three weeks,<sup>2</sup> patients should be told that it may take as long as four to six weeks.<sup>10</sup> If the patient experiences difficulty in adapting (i.e., blurred vision, eyestrain, headaches), switching the distance and near-corrected eyes should be considered.

When prescribing for monovision, it is important to initially prescribe the entire correction for near in one eye and for distance in the other eye (i.e., do not underplus the near eye and/or overplus the distance eye) although minimal adjustments to each eye may be demonstrated to the patient for the best balance between distance and near vision. In addition, the patient should be encouraged to wear either two distance lenses or over-spectacles incorporating a distance correction over the near eye whenever they are performing critical distance tasks (i.e., especially driving at night). Monovision patients should also be advised to avoid driving or operating dangerous machinery during the first two to three weeks of adaptation.<sup>11</sup>

### **Who are good candidates for monovision?**

The age and near addition of the patient can be predictive of success, with lower addition patients (+1.25 to +2.00D) being more successful than higher addition, more advanced presbyopic patients.<sup>2,12</sup> The visual needs and lifestyle of the patient must be evaluated when considering monovision. Individuals in occupations such as teaching, the performing arts, public speaking and sales, who desire the benefit of being able to change viewing distances constantly and still remain focused, are good candidates. Likewise, patients who have discontinued multifocal contact lens wear due to blurred vision may exhibit better success when refit into monovision.

### **What are the disadvantages to monovision?**

In monovision, the vision in one eye will always be unclear at far and the other eye unclear at near. Because of this situation, detailed depth perception (stereopsis) will be reduced. Although this primarily affects tasks performed at close distances, there could be a reduction in distance depth

perception as well, particularly in challenging visual situations (such as driving in poor weather or at night). It has been found that the stereopsis reduction increases as the add increases.<sup>13,14</sup> In addition, the stereopsis decrease is greater with monovision than with bifocal soft lenses<sup>15,16</sup> and patients have preferred soft bifocal lenses versus monovision when provided with the opportunity to wear both modalities.<sup>16,17</sup>

Research and clinical observation have demonstrated that most individuals have enhanced visual acuity and perceived clarity when both eyes are corrected equally. For this reason, individuals may notice a reduction in clarity and/or visual acuity when they are corrected with monovision. The quality of vision via contrast sensitivity function (CSF) has been found to be reduced in monovision and this can impact performance on critical distance tasks.<sup>18-20</sup> Multifocal gas permeable (GP) wearers have been found to achieve the highest quality CSF values, followed by soft bifocal lenses, with monovision wear resulting in the lowest or least values.<sup>20</sup> Individuals with a tendency for their eye(s) to turn in (i.e., esophoria) when viewing at distance tend to have this problem increased when wearing monovision.<sup>12,21</sup>

Studies have also concluded that performance on different work-like tasks was reduced in those persons corrected in a monovision mode compared to other methods (reading glasses, bifocals and non-monovision contact lenses).<sup>15,22,23</sup> It is postulated by some that a monovision correction could lead to visual stress when using a computer for prolonged periods. If prolonged and critical distance vision is desirable, monovision is not a good option. While the determination of suitability is best left to an eye care practitioner after a complete eye and vision examination, there are a few characteristics that might make a person unsuitable for monovision.

- 1) Amblyopia (moderate). A person with an uncorrectable reduction in vision in one eye will find it difficult to have this eye primarily responsible for detailed vision at any distance.

- 2) Critical Detail Needs. If work or hobby activities require exceptional far vision or exceptional near vision for prolonged periods of time, monovision might be disappointing.
  
- 3) Driving. Driving with monovision has been a controversial topic. Older individuals, having the highest crash rate per distance traveled, pose the largest threat to road safety.<sup>24</sup> Monovision should add to the problems older individuals experience while driving at night and, in fact, as many as 80% of monovision patients have reported problems with night driving<sup>25</sup> with glare being a common symptom.<sup>26,27</sup>
  
- 4) Flying. The Federal Aviation Administration does not approve of the use of monovision when piloting an aircraft in the USA.

### **The American Academy of Optometry's Position on Monovision**

Many, but not all, members of American Academy of Optometry recommend or present a patient with the option of the correction of an individual's refractive error in a monovision modality, when it is judged to be acceptable for the individual. It is in the best interest of prospective lens wearers or surgical patients to be informed of the risks and benefits associated with monovision, and of the alternative methods of correction. Certainly, clear, binocular (both eyes corrected for distance and near) vision is most desirable. However, many patients perform acceptably with monovision. Limitations in stereopsis and the potential reduction in confidence during activities such as driving must be carefully conveyed to the prospective monovision patient.

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