

Myopia Prevention and Control

Treatment: Bifocal Contact Lenses

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How are bifocal contact lenses used for myopia control?

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Bifocal contact lenses are worn during the day and removed at night. They give clear vision for objects far away and objects nearby. Generally they are worn every day although occasionally a day without the lenses will not adversely affect the treatment. The lens are worn as long as myopia progression is considered a risk.

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How do bifocal contact lenses work for myopia control?

Bifocal contact lenses have been shown by [Aller and Wildsoet](#) to slow the progression of myopia. The reason they apparently work is not that they reduce the reading effort, which they do, but rather that they create a ring of increased power surrounding central vision that the eye interprets as a "stop signal" for further growth. When eyes grow longer, they become more myopic. The signals for this growth are in the peripheral retina. You can read about it in the different sections of the Definitions menu. Here's a link to [the hyperopic defocus section](#).

There have not been many published studies of soft bifocal contacts being used for myopia control, but the Aller and Wildsoet study showed an 87% reduction in myopia progression for the first year.

CIBA Vision is testing an anti-myopia silicone-hydrogel (soft) contact lens that is reported to slow myopic progression by 34% over one year and 49% if one parent was myopic. CooperVision is marketing a lens called the MiSight in Hong Kong on a trial basis, reported to be a daily disposable made of the ProClear material. The lens reduced myopic progression by 37% over 20 months. You can read a bit more about them in a report from the [British Contact Lens Association Clinical Conference](#).

Each of these studies is for one year. Other non-contact lens methods have been found to have less effect after the first year and so it remains to be seen if the contact lens effect is multi-year.

Are there any side effects?

The greatest risk of any contact lens wear is abrasion and infection. Bifocal lenses used to slow myopic progression are no different, no better or worse, than regular contact lenses worn by millions of people. The risk is greatly reduced by following instructions in lens care, handling, wearing time and follow-up visits with your doctor who can often identify small problems before they become more severe.

Bifocal lenses are generally a bit thicker than single vision lenses and so they may not be as comfortable to begin with for someone who is used to wearing thinner lenses. Adaptation, if necessary at all, usually occurs within a few weeks. There are always some people who are too sensitive, whether psychologically ("squeamish") or physically (dry eyes, difficult to fit eyes, etc.) but these can usually be overcome with either time or proper treatment.

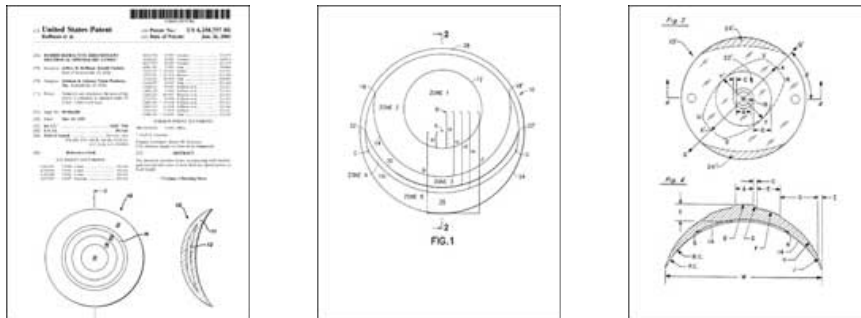
Children, even young children, can make excellent contact lens patients. They need a certain level of maturity (they won't throw away a lens bothering them for example) and they need more parental supervision, but they often can be trained how to apply and remove their lenses more quickly than adults can be trained.

Risks specific to bifocal contact lenses used as a treatment for myopia progression are essentially the risk that it won't work. There can be no guarantee of how the eye will respond but the data is very encouraging. Some eyes may do better. The current data indicates the treatment works for something called "near eso fixation disparity" (a tendency for the eyes to cross slightly when reading) but it is suspected that it may work for other groups as well.

What are bifocal contact lenses?

Bifocal contact lenses are prescription devices worn on the eye to change the eye's focus. If the eye is nearsighted (shortsighted or myopic) for example, the lens is normally designed to give clear distance vision. Sometimes this is called a monofocal (one-focus) lens. A bifocal (bi or two-focus) lens has two powers which can be located at different locations on the lens. In glasses, the bifocal power is usually (not always) located at the bottom of the lens. In contact lenses, the bifocal power is usually (not always) designed as a ring of power change, similar to a "bull's eye" target. This allows the lens to rotate on the eye without changing how it performs optically. These are called concentric ring designs.

It actually gets much more complicated than this. In an attempt to obtain useful powers, many optical designs have been created. Terms such as diffractive simultaneous vision, hybrid refractive birefringent multifocals, aspheric, Fresnel lenses and other terms give a hint of the possible optical complexity of these small prescription devices. Here are pictures of three different patents for bifocal contact lenses to give you an idea.



What are bifocal contact lenses normally used for?

Bifocal contact lenses are normally used for the condition of presbyopia, which is what happens to everyone, usually in their forties, when it becomes difficult to focus on both distant objects such as street signs and near objects such as a book. The solution is to make the corrective lens have two powers, one for each distance. Many types of bifocal, multi-focal and progressive power glasses have been designed for various occupations and tasks. The eye turns behind the lens in the frame to view through different portions of the lens to obtain the power necessary for the object being viewed. A common design would have the person looking straight ahead to focus on distant objects and looking down to focus on near objects.

The challenge in a contact lens is that the eye doesn't move much behind the lens - the lens is fairly stationary and moves with the eye instead. The different powers necessary to view objects at different distances are pushed close to central vision with the result that there is usually some overlap of powers, creating some blur. Generally the blur is adapted to and not a problem.

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