

Thomas H. Collison Ltd

Information Leaflet

Refractive Errors

The term "refractive errors" applies to a family of eye conditions that are caused by the focussing power of the eye being too strong or too weak.

In most cases these conditions can be corrected relatively easily by using spectacle lenses or contact lenses and rarely will they cause any major concerns.

Normal Sight or Emmetropia

In normal sight rays of light enter the eye through the cornea and are focussed as a point on the retina by a combination of the curvature of the cornea, the power of the crystalline lens and the length of the eye. All of these surfaces should be perfectly spherical to ensure sharp vision.

In the event of any part of this focussing mechanism not being quite correct then the eye will not present a focussed image on the retina and sight will be blurred.

When this happens the eye is said to be ametropic. The type of ametropia may be due to the power of the eye being wrong (refractive ametropia) or the length of the eye being wrong (axial ametropia). Alternatively if any part of the system is not spherical the eye is said to be astigmatic.

Ametropia is divided into three main groups:

Long Sight or Hypermetropia

In hypermetropia the image falls behind of the retina due to eye being too weak or too short. To obtain clear sight you need to add power to the eye's focussing system and plus power spectacles or contact lenses are prescribed.

Long sighted people can normally see quite well for distance but have trouble reading and using computers. Plus power lenses are convex in shape and are thicker in the middle than the edge.

Short Sight or Myopia

In myopia the image falls in front of the retina due to eye being too strong or too long. To obtain clear sight you need to reduce the power of the eye's focussing system and minus power lenses or contact lenses are prescribed.

Short sighted people can usually see near vision task more easily than distance and tend to need to wear their correction all of the time. Minus power lenses are concave in shape and are thicker at the edge than in the middle.

Astigmatism

In astigmatism the eye's optical system is not completely spherical. This results in there being two focussing points and an elongated blurred image is produced on the retina. The astigmatism is usually due to the eye having different power meridians with a maximum and minimum power acting at right angles to each other, occasionally it may be due to surface distortion of the cornea or a tilted crystalline lens.

To correct astigmatism the spectacle lens or contact lens is specially made with a maximum and minimum power to balance the eye power. These lenses have a cylindrical component.

In astigmatism the vision is blurred and often elongated in one direction. Most eyes have, and can tolerate, a small amount of astigmatism but if the value increases the sight is adversely affected. Astigmatism can also be present following certain eye operations such as cataract operations and corneal grafts and may also be induced in trauma if the lens within the eye is dislodged or dislocated. Astigmatism is also a feature of keratoconus.

Presbyopia

The lens within the eye has the ability to alter its shape to change its power. This is called accommodation. As a result of this ability the eye can increase its power to focus on nearer objects. However as we age the lens within the eye produces waste cells which cannot be cleared from the matrix of the eye. This leads to the lens becoming stiffer and less able to change its shape such that focussing on near objects becomes more difficult. This happens to all eyes over the age of 40 years and is known as presbyopia.

The simplest solution to presbyopia is to wear additional plus lenses when needing to read. Single vision reading lenses effectively compensate for the loss of accommodation. Alternative solutions to the problems associated with presbyopia are multifocal spectacle lenses or multifocal contact lenses.