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I've got a stigma!

A Guide for Optical Assistants

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Introduction

The term 'astigmatism' is a little unfortunate in itself, as even the word sounds ugly - like it could be a disease! Astigmatism is something that few patients are aware of, and if they have an astigmatic prescription, they often do not really know what it means. Those patients who have been told about this part of their vision correction may incorrectly refer to this as 'having a stigma' (because 'astigmatism' is a word outside the everyday vocabulary of most people), or they refer to having 'a' 'stigmatism' or even 'an astigmatism'. They may even describe themselves as having 'rugby ball' eyes. The correct phraseology is that the patient has astigmatism, and it is more common than most people realise. Over 25% of patients have astigmatism that is at the level where they require contact lenses with the astigmatic component incorporated in it. This booklet systematically reviews the various aspects of understanding astigmatism, so that all staff feel confident when discussing this aspect of a patient's prescription and their suitability for contact lenses.

All about astigmatism

What is it?

A spectacle prescription can be considered to be the 'recipe' to provide the patient with the best vision possible. The astigmatic component of the prescription is simply one of the 'ingredients'.

RIGHT	**Sphere**	**Cyl**	**Axis**	**Prism**	**Base**		**Sphere**	**Cyl**	**Axis**	**Prism**	**Base**	LEFT
	-1.00	-1.25	180			Distance	-1.50	-1.00	175			
						Near						

In the prescription example above, the 'sphere' part of the prescription indicates how long-sighted or how short-sighted the patient is, the 'cyl' part indicates the quantity of astigmatism the patient has and the axis describes the precise location of the astigmatism (like the hours on a clock face and the degrees on a protractor).

As a general rule, once the amount of cyl is 0.75 to 1.00 D, the patient would notice an appreciable difference in quality of vision with a contact lens for astigmatism versus a regular contact lens that simply corrects only long-sightedness or short-sightedness (often referred to as 'spherical' contact lenses — meaning that the contact lens corrects only the 'sphere' part of the prescription). This can make the difference between reasonable vision to high definition or 'HD' vision. If the cyl is less than 0.75 (so cyls such as 0.25 and 0.50), these patients can achieve good vision in regular spherical contact lenses.

What causes it?

Where long-sightedness and short-sightedness can be attributed to eyes which are either too small or too large in relation to the 'ideal' for perfect vision, astigmatism originates from shape differences in either the cornea (the clear layer in front of the coloured part of the eye) or the lens (situated behind the pupil) or a combination of the two.

Eyes with no astigmatism at all usually have a very regular front surface shape which can be compared to the surface of a football. People with astigmatism have frequently had their eyes compared with rugby balls or eggs to help explain the difference in shape compared to someone with no astigmatism. Patients need to know that having astigmatism does not make them 'weird'! Staff in the practice can help to dispel the myths and prevent the patient believing that they have 'pointed' eyeballs!

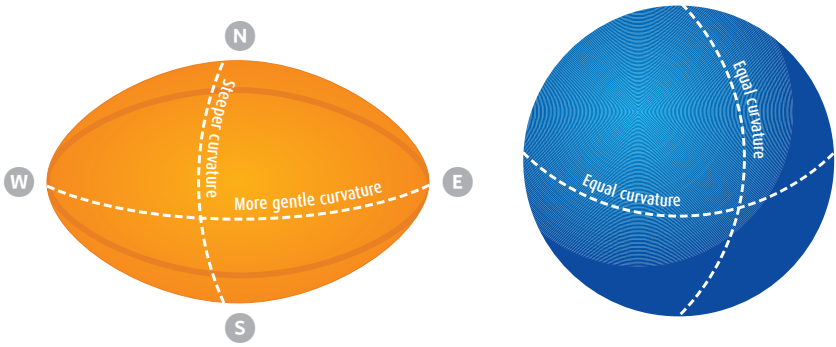

Image 1.

A more helpful method for explaining the astigmatic shape of the eye surface, is to compare the surface of the eye (the cornea) to be like a microscopic hill. Immediately, this presents a three dimensional image in the mind of the patient. For example, with an astigmatic corneal surface, from North to South the hill is a steep climb, and from East to West the slopes are more gentle **(Image 1)**. With large amounts of astigmatism (e.g. over 3.00D), there is a much greater difference in the two directions. The axis of the cyl refers to the location of the slopes, so axis 90 and 180 refers to slopes in the North-South and East-West direction (or 12 o'clock and 3 and 9 o'clock), whereas axes of 45 and 135 will indicate a hillside that has been rotated in between the horizontal and vertical positions (closer to 'ten to' or 'ten past' the hour).

When explaining astigmatism to a patient, it is important that they realise that astigmatism is very common and is easily taken care of both with spectacles and with modern contact lenses. Twenty years ago, contact lenses for astigmatism were not as advanced as they are today, so many patients with astigmatism were told they were unsuitable for contact lenses. With the wide choices of contact lenses for astigmatism available now, the news for people with astigmatism who want to be free from their spectacles is good — the key is making them aware that technology has moved on.

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Additionally, there is a percentage of people who have tried contact lenses in the past who gave up. The chief reason for stopping lens wear is ***comfort***, and there have been significant advances in both lens design and lens materials which provide these patients with another opportunity.

The second most common reason for discontinuing wear was problems relating to ***vision***, so having the option to correct astigmatism is yet another factor governing the potential to be more successful if they were to give lenses another try. Lapsed wearers are more likely to try contact lenses again than someone who has no experience of lens wear.

How does it feel to be astigmatic?

People with astigmatism can sometimes have a variety of symptoms, because often their astigmatism exists in addition to myopia (short-sightedness) or hyperopia (long-sightedness) — the usual symptoms of poor distance or uncomfortable near vision apply respectively. When astigmatism is added into the mix, vision can appear slightly less bold, distorted and some patients might describe 'ghosting' or a 'doubling' effect of text on a page.

Simulated view with astigmastism uncorrected

Simulated view with toric lens correction

How is it tested?

During the course of an eye examination, the optometrist measures the prescription in each eye typically with an instrument called a 'retinoscope' which shines a light through the pupil, and how the light moves across the pupil indicates the amount of myopia or hyperopia in addition to any astigmatism. This technique also reveals the location of the astigmatism — the axis of the cyl.

Whilst this technique determines the spectacle prescription, further refinements are made with the patient guiding the final fine tuning adjustments describing when the various lenses make the letters on the eye test chart clearer. The frequently asked question of 'lens 1 or lens 2' is systematically used for finding the most accurate cyl power for the patient as well as the best position or axis.

Having discovered the spectacle prescription in full, the optometrist measures the shape of the cornea using a keratometer or a topographer. These instruments measure the slopes of the hillside of

the front of the eye. These readings (often referred to as 'k-readings') not only indicate whether the eye surface is steep, average or flat compared to the norm, but also reveals if the cornea is solely responsible for the astigmatism or whether there is some 'contribution' from the lens inside the eye ('lenticular astigmatism'). This information allows the optometrist to decipher what type of contact lens will work best for the patient.

Contact lenses for astigmatism

Statistics

Around 6% of the adult population in the UK wear contact lenses. Disposable soft contact lenses (replaced monthly or more frequently) are the most popular in the UK with over 90% of people being fitted with this type of lens. Around 25% of all soft lenses fitted in the UK are soft contact lenses for astigmatism.

Optimising lens wear

Scientific evidence has shown that the more frequently a soft lens is replaced, the better the lens will perform in terms of vision and comfort. This is similar for rigid lenses, although their durability means that the optimum frequency of replacement is between 6 months to 12 months depending on the wearer.

The tears wash the lens on every blink, and tears contain oils (to lubricate the eye) and proteins (which defend the eye against bugs). All contact lenses become soiled by the tears and form 'deposits'. For this reason, any lens that is re-worn must be carefully cleaned and disinfected to keep the lens comfortable to wear, clear for vision and to reduce the number of bugs on the lens to minimise the risk of an eye infection. This is one of the key reasons for the popularity of daily disposable lenses, in that a brand new lens is used for every wear without the need for cleaning and disinfecting solutions. It should also be reinforced that contact lenses are only sterile in the lens packaging, and once in the hands of the patient, lens cleanliness is dependent on good hygiene practices such as thorough hand-washing.

Convenience is one of the key reasons for the popularity of daily disposable lenses

Oxygen

The cells in the human body require oxygen to remain in a healthy condition, and the cells on the central surface of the eye, which make up the cornea (the clear layer in front of the iris and pupil) are no different. The cornea is unusual in its anatomy in that it has no blood supply, so the vital supply of oxygen to the cells in the cornea comes mainly from the air. Significantly reducing the flow of oxygen to the cornea can be detrimental, and the cornea swells with fluid — similar to when skin swells and turns white underneath a plaster. A contact lens is worn directly on the cornea, so the ideal contact lens allows oxygen to pass through to the cornea as if there is no contact lens there. Many recent advances

The ideal contact lens allows oxygen to pass through to the cornea as if there is no contact lens there

have been made in the oxygen breathability of lenses, in particular silicone hydrogel soft lenses.

Most modern contact lenses have good oxygen breathability (referred to as 'permeability' and technically 'Dk' which is a measure of how oxygen passes through a given material), although the wearing pattern and prescription strength must be considered as some lenses perform better than others in this regard.

Soft lens breathability

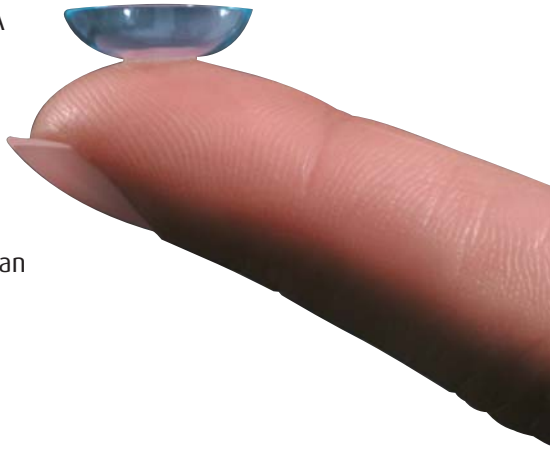
Prior to silicone hydrogel lenses, soft lenses were wholly dependent on the water within the material to transport oxygen through to the cornea. Soft lenses range from less than 40% (low water) to 40-60% (mid-water) to over 60% (high water) in their moisture contents. In short, oxygen from the air dissolves in the tears in front of the lens, 'swims' through the water within the lens, emerges into a fine layer of tears behind the lens and then enters the first line of surface cells at the eye. The more water there is in the lens, the easier it is for oxygen to move through to the eye. The moisture held in soft lenses provides a 'liquid path' for oxygen from the atmosphere to move through and in turn reach the eye surface. The plastic from which a regular soft lens is made is not breathable, it is the fluid within the lens that promotes the breathability of the soft lens material.

The fluid within the lens promotes the breathability of the soft lens material

The thickness also plays a role in oxygen performance

Around 70% is the highest amount of water that can be put into a soft lens without the lens becoming too fragile (higher water content lenses have been shown to tear more easily than low water content lenses). Interestingly, higher water lenses are thicker than lower water lenses of the same power and the thickness also plays a role in oxygen performance. Whilst there is more freedom for oxygen to pass through in a high water lens, the thicker lens means the oxygen has further to 'swim' in order to reach the eye surface. For this reason, the most efficient performer has been the thinner mid-water content lenses, which offer an easy 'swim through' over a shorter distance. Many disposable soft lenses are in this category, and manufacturers will state the percentage water content on the packaging.

Higher prescriptions require thicker contact lenses just as they do in spectacle lenses (minus contact lenses are thicker at the edge and plus lenses are thicker in the centre). For this reason, patients with prescriptions over 4.00D who require full-time wear may be offered lenses with higher oxygen performance for healthy lens wear. Clearly, if someone is to wear his or her contact lenses from waking to bedtime, the lens must perform so that sufficient oxygen reaches the eye surface (especially when the wearer does not give their eyes any lens-free time). A more extreme scenario is extended wear when the patient wears contact lenses continuously for up to one month. Sleeping in contact lenses requires high performance lenses, and silicone hydrogel lenses for continuous wear have made this an option.



Lens types

Soft contact lenses (SCLs)

SCLs are like microscopic sponges and are very thin, flexible and remain moist when on the eye. They are around 14.0 mm across and cover the whole of the coloured part of the eye and slightly onto the white of the eye. On a blink they move about 0.3 mm and are the most popular lens choice in the UK.

Soft lenses are available in a wide variety of prescriptions, and these include lenses to correct astigmatism. Such lenses are often called 'toric' lenses, which means they not only have the sphere part of the prescription, but they also have the cyl and axis. These lenses require two powers: the sphere power is all over the lens, and the cyl power must be placed at the axis specified. In order to achieve this, the lens is designed in such a way that the eyelids work the lens into the correct axis position within about a minute of being placed on the eye. Most lenses have an axis marking, so that the practitioner can check that the lens is sitting at the correct axis. In less than 20% of cases, a small

adjustment of axis may be required if the lens moves off position due to the shape of the eye surface and the position and tension of the lids holding the lens in place. This judgement can be made only when the specific lens is placed on the individual eye. For this reason, there can be some small differences between the axis of the spectacle prescription and the axis of the contact lens specification.

As a general rule, once the spectacle prescription cyl is 0.75 to 1.00D, the patient will be fitted with either a soft toric lens or a rigid lens (see below). Typically disposable soft toric lenses are available in cyl powers from 0.75 to 2.75, so this covers a wide range of prescriptions. For cyls outside of this range, or when certain axis positions are less widely available, custom soft toric lenses are sometimes required and these are manufactured to order.

Silicone hydrogel soft lenses

When silicone is added to the plastic of the soft lens material, this has a significant impact on oxygen transmission, because oxygen is now able to move through the plastic of the lens in addition to any fluid in the lens. The water added to silicone hydrogel lenses serves to make the lens soft and flexible. In the UK, there are a number of silicone hydrogel materials on the market and Bausch & Lomb was the first to introduce a silicone hydrogel toric lens (**PureVision® Toric**). Practitioners may choose to fit silicone hydrogel lenses as a daily wear option simply when a long wearing time or high prescription of the patient demands better oxygen performance.

Rigid lenses (RGP - rigid gas permeable)

RGP lenses are made from various types of plastic materials, which vary in terms of their durability and how well the material allows oxygen to pass through. They are much smaller in size at around 9.5 mm and cover about two-thirds of the coloured part of the eye. They move about 1-2 mm on a blink which can create some initial lens awareness. The rigidity of the material means that there is a 'wearing in' period — rather like a brand new pair of shoes — with most successful wearers achieving all-day wear in about two to four weeks. **Virtually all prescriptions, including astigmatic prescpriptions, can be made in rigid lenses, and very high prescriptions and some complex eye shapes benefit most from this type of lens. (For example Maxim™ Toric from Bausch & Lomb)**

With rigid lenses, cyls from 0.25D up to about 2.50D can be accommodated in a regular lens — this is because tear fluid pools in the 'gap' between the back surface of the contact lens and the eye surface and forms a 'tear' cyl. For cyls greater than 2.50D, the use of a regular rigid contact lens is rather like trying to fit a flying saucer on a rocky mountain, so the back surface of the contact lens is specially manufactured to match the curvature of the eye surface. In doing so, there is no longer a convenient pool of tears to correct the cyl, so the front surface of the rigid lens must be reshaped to provide some cyl power on the front of the lens. This type of lens is called a bitoric and the written order for this type of lens will include lots of numbers.

Choosing the way to wear lenses

Before a patient has experienced wearing contact lenses, not only in the practice, but also for a few days in their normal work and leisure environments, it can be difficult for them to predict how they might wear their contact lenses. Some patients start wearing contact lenses with a specific occasion in mind (e.g. a wedding) and others have simply found spectacles inconvenient in some situations (e.g. during sport). Whatever the reason, their long-term goals for their wearing pattern will become more apparent with increasing experience with the lenses. Practitioners find it helpful to allow patients some time to adapt to handling and wearing lenses, before deciding on the final lens of choice. In this regard, daily disposable lenses provide an easy starting point, as the patient does not have to concern themselves with using solutions. **The final lens of choice depends on three factors: the hours per day the patient is likely to wear their lenses, how many days per week the patient wants to be spectacle-free, and finally the cost to the patient in relation to the benefits the lenses give them.** It is important to always remember what might seem expensive to one person, is 'very affordable' to another. Patients need to be offered the full range of possibilities so that they can help decide which is the best choice for them.

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The options available

Contact lenses for astigmatism are available as a daily disposable such as SofLens® daily disposable for Astigmatism (single use so no solutions are required), as a monthly disposable (which must be cleaned and disinfected after every wear), and silicone hydrogel monthly disposable lenses (which also must be cleaned and disinfected after every wear some patients may choose to wear these lenses on a flexi or extended wear basis where they sleep in the lenses occasionally or for up to 29 nights).

Daily disposable torics

As a general rule, daily disposability appeals most to part-time wearers, and also to those patients who wear their lenses full-time but still want the simplicity of a fresh lens every day without the need for a cleaning regimen with solutions.

Monthly disposable torics

These lenses have enjoyed significant success in the correction of patients with astigmatism and there is a very wide choice of lens sphere powers, cyl powers and cyl axes making them suitable for a large number of astigmatic patients. Patients who have a long wearing time may be offered to try the silicone hydrogel equivalent of this lens for extra oxygen performance.

Silicone hydrogel toric (monthly disposable)

The key aspect of this lens type is the material from which the lens is made. In this regard, these lenses offer high oxygen performance when patients require longer wearing times making this type of lens ideal of someone who works long hours or is simply too busy to have to take their lenses out earlier in the day. Parents who have to deal with young children during the night can find wearing lenses on a continuous wear basis very convenient, as they do not have to reach for their spectacles in the dark before attending to their child.

Can patients with astigmatism wear contact lenses?

Most people requiring a spectacle prescription can be fitted with contact lenses, and astigmats are no exception. A full eye examination helps to determine the suitability of an individual. The types of lenses to choose from firstly depends on the **spectacle prescription** (is a lens available for the prescription — including the sphere power, the cyl power and the cyl axis) and secondly, it depends on **how the person wants to wear their contact lenses in terms of hours per day and the number of days per week** (see section on oxygen).

It should be noted that there are two ways of recording a spectacle prescription, and one is referred to as 'minus cyl form' and the other is referred to as 'plus cyl form'. For contact lenses, the convention is to use the 'minus cyl form'. There is a straightforward mathematical process for converting from one form into the other if necessary.

When ordering contact lenses for astigmatism, it is essential that all the required numbers are recorded:

	BRAND NAME: Bausch & Lomb **SofLens® daily disposable for Astigmatism**				BRAND NAME: Bausch & Lomb **SofLens® daily disposable for Astigmatism**			
RIGHT	**BC**	**Diameter**	**Power**		**BC**	**Diameter**	**Power**	LEFT
	8.6	14.2	-1.00/-1.25 x 180		8.6	14.2	-1.50/-0.75 x 180	

Spectacles for all contact lens wearers

Many patients believe that their choice is either spectacles or contact lenses and not a marriage of the two. Successful contact lens wearers own a good quality pair of spectacles that they could wear in public if necessary. However, most full-time contact lens wearers find the concept of wearing spectacles in public very alien, and when recommending spectacles to these patients they can be reassured that being seen in public wearing them is not mandatory!

For those patients who are happy spectacle wearers, occasional contact lens wear can be a positive benefit, in that it provides them with a different 'look' when they get dressed up for a special event, or simply that contact lenses offer a much more practical alternative to spectacles for certain situations or environmental conditions (e.g. when spectacle lenses would be prone to steaming up or getting wet).

The idea of being able to see without spectacles is very appealing to patients who have never considered the contact lens option, and can be sufficient to motivate them to try contact lenses, perhaps for a special social occasion in the first instance. Contact lenses helpfully serve as a spare form of vision correction should they inadvertently break their 'three piece rimless' spectacles which can require several days to be manufactured.

Dealing with enquiries

Astigmatism is **not** an eye disease! The reality is that around 95% of patients have some degree of astigmatism and over 25% of patients have astigmatism that, if they are fitted with contact lenses, will derive significant visual benefits and enhancements from a contact lens specifically for astigmatism. **A wide choice of contact lenses for astigmatism is available**, and once the spectacle prescription is known with all the details of sphere power, cyl power and axis, the patient can be advised about their suitability to try contact lenses and the specific lenses obtained for the patient to try. Creating awareness of the opportunity for trying contact lenses for astigmatism is a key factor when encouraging these patients to consider their vision correction options.

Sarah Morgan *is an optometrist and staff development consultant. At the University of Manchester she is involved in undergraduate teaching across all three years of the optometry programme. She has trained hundreds of staff in her tailored interactive seminars. Sarah is the author of two books 'Up front — a practice knowledge guide' and her new book 'The Complete Optometric Assistant' includes the everyday information staff require in addition to recommendations on how best to train and develop staff in the practice. She has recently performed at the Comedy Store in Manchester and was the winner of the NIVEA Funny Women Awards 2 Hour Challenge 2008.*

Ordering and contacts

Local rate customer service number: **Tel: 0845 602 2350 Fax: 0845 602 2351**
Republic of Ireland direct order line: **Tel: 1800 409 077 Fax: 1800 409 083**
Online ordering: **www.bauschonline.co.uk**
Order by email at: **orderline@bausch.co.uk**
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