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Contact Lenses (Types and Care)



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Background

Contact lenses (CLs) are optical devices that sit on the surface of the cornea.^[1] There are 1.65 million CL wearers in the UK.^[2] Contact lenses have a range of uses but are most commonly worn as an alternative to spectacles in the correction of **refractive errors**. They are often chosen for cosmetic reasons but may also have very practical advantages in certain sporting or occupational situations where spectacles can get broken, spattered or prevent the use of protective eye wear.

Lenses vary in material (rigid versus soft), size (corneal versus the larger scleral lens), mode of wear (daily wear versus long-term use) and conventional (annual replacement) versus disposable lenses (daily or monthly replacement).^[1, 3]

They need meticulous care if complications are to be avoided, particularly as some of these can be sight-threatening, see related record on **Contact Lens Problems** for more detail about these. Some suggest that written informed consent should be obtained when they are prescribed, regarding the risk of complications.^[2] Lenses should normally not be worn for more than a specified number of hours each day (this depends on the individual lens) and should not be kept in overnight unless specified by the CL practitioner. Furthermore, if a CL wearer develops a **red eye**, they should immediately stop wearing the CLs and seek medical advice. Although complications are rare as a whole (occurring in less than 5% of CL users), those using soft CLs and CLs overnight are at greater risk of developing them.^[4]

The fitting and review of CLs is usually carried out by community optometrists but more complex cases (eg extremes of refractive error, therapeutic and cosmetic lenses) are reviewed in a hospital setting.

Refracting contact lenses^[5, 6]

- These principally correct **myopia** and **hypermetropia**, **astigmatism** and, more recently, they have been used in the management of **presbyopia**.
- Although the great majority are used in preference to spectacles for cosmetic reasons, certain corneal conditions warrant CL wear to achieve optimal visual acuity. These include irregular astigmatism (such as is found in **keratoconus**, where the cornea is cone-shaped), the presence of superficial corneal irregularities and anisometropia (inequality in refractive power between the two eyes).^[7]

There are different types of refracting CLs:

- **Hard (rigid) CL** - polymethylmethacrylate (PMMA): they are now seldom used. They are the least hydrophilic lens, and have the greatest deleterious effect on corneal function, restricting oxygen availability and depleting glycogen stores.^[8] They can give rise to a number of problems such as **corneal oedema** (found by some to be present in 6% of patients after six hours' wear^[9]). However, they give a good refractive result, they are easy to manipulate and last a long time. They have largely been superseded by gas-permeable and soft CLs^[4] (see below) but they still have a role in the management of severe keratoconus, severe, irregular astigmatism and some ocular surface disorders.^[1]

- **Soft (hydrophilic or hydrogel) CL** - polymers of hydroxyethylmethacrylate (HEMA), silicone and other similar materials: hydrophilic (composed of up to 80% water) and oxygen permeable.^[10] These popular lenses (used by over 80% of CL wearers)^[4] are the most comfortable to wear but they may not give the best refractive result. There are various types, often described by their replacement frequency - this may be daily, two-weekly, monthly, or in some cases three-monthly or longer. The most commonly fitted soft lenses in the UK are daily wear, monthly replacement lenses, followed by daily disposable single-use lenses.
- **Gas-permeable rigid CL** - these combine the best properties of hard and soft CLs, having a high gas-transfer and reduced toxicity. They are easier to handle than soft lenses, they offer excellent visual acuity and they are more suited than soft CLs to astigmatic patients.^[9] Some types are approved for overnight or extended wear. Others are specifically used overnight only with the aim to distort the shape of the cornea in a controlled fashion in order to correct myopia during the day (orthokeratology).^[4]
- **Scleral CL** - large, rigid lenses that arch over the cornea, resting on the sclera. They are very comfortable because they do not come in to contact with the cornea itself. Usually they are only fitted for specific medical conditions by contact lens practitioners specialising in scleral lenses.

The type of lens used needs to be suitable for the patient's life style, taking into account occupation, leisure activities and travel.

Diagnostic and therapeutic contact lenses^[7, 11]

- Goniolenses are a group of lenses that are used in clinic and in theatre to look at the iridocorneal angle, principally in the assessment of **glaucoma**. Some of these are equipped with additional mirrors enabling visualisation of the fundus. These lenses remain on the cornea only during the period of examination.
- Electroretinography lens - this is used in specialist centres to make certain diagnoses: these lenses look at electrical function in the eye much in the same fashion as an electroencephalogram.
- Soft bandage CLs may be used to promote epithelial healing where there are persistent corneal epithelial defects and erosions. They also have a role in pain relief in patients suffering from **bullous keratopathy** (where exposed corneal nerve endings are subject to the shearing force of the lids during blinking) and in wet filamentary **keratitis**, seen in patients with brainstem strokes or following chemical exposure.^[5]
- Drug delivery systems - work is being done to develop lenses that provide a controlled release of topical ocular drugs: these are not currently in widespread use.^[8]
- A combination of bandage CLs and drug delivery systems can be found in the form of collagen shields^[5] - a special type of biodegradable lens which can last for a maximum of 72 hours and which can be impregnated with antibiotics. They biodegrade in situ and therefore do not have to be removed.

Other contact lenses^[11]

- Painted CLs - these may be worn to improve cosmesis in an unsightly blind eye or to provide an artificial iris in **aniridia**, where there is an **iris coloboma** or **albinism**.^[3] These lenses are also sold commercially as a novelty (e.g to change iris colour or change pupil shape)^[1] and can be manufactured to correct refractive errors concurrently.

Contact lens care^[12]

Important advice for users of contact lenses

Ask yourself, each time you use your lenses:

- Do my eyes **feel good** with my lenses (no discomfort)?
- Do my eyes **look good** (no redness)?
- Do I **see well** (no unusual blurring with either eye)?

If 'no' to any of these, leave the lenses off and get immediate advice.

Patients will have been taught lens care by their CL provider. CL care varies according to the type of lens worn. Some key points are:

- Daily disposable lenses are thrown away at the end of the day: there are no care solutions for these and patients will have been told that one cannot use lens cleaning solutions to try to prolong their life.
- Repeated use lenses need to be disinfected (solution, rubbing and rinsing the lens): fresh solution needs to be used every time and there must not be a mixing of different types of solution. They also need to be kept hydrated when not in use. There are various commercially available solutions to carry out one or both of these functions. The storage case needs to be rinsed daily and allowed to dry after use. It will need replacing on a monthly basis.
- All-in-one solutions are widely used (this solution can be used for each of the steps in CL cleaning) but some patients react to these and need separate solutions for each step.^[3]
- Tap water, saliva and swimming pool water should not touch the lens. The British Contact Lens Association (BCLA) advise that CLs should not be worn for swimming, hot tubs or water sports, unless wearing watertight goggles.^[13] They advise CLs should be discarded if they come in contact with the water; hence, daily disposables are likely to be the best choice for swimmers.
- The contact lens case needs to be cleaned (rinsed and air dried daily, scrubbed with a brush and boiled weekly)^[3] and replaced regularly (at least 3 monthly) as it can be a source of contaminants.^[14]

Further information can be found on the British Contact Lens Association website (see below).

Contact lenses and medication

Using eye preparations

- As a rule of thumb, it is best not to wear CLs when topical eye treatment is necessary: this becomes an absolute rule when treating a red eye (which may be a CL-related microbial keratitis).
- Ointment use is incompatible with any CL wear.
- Rigid lenses can be worn with drops: these can be applied over the lens.
- Soft CLs can only be worn if preservative-free drops are used (look for the presence of benzalkonium chloride in the ingredients). Preservatives accumulate in hydrogel lenses and may induce toxic reactions.

Systemic drugs

These can interact with lenses in a number of ways. Examples are provided below but, if you are uncertain, it is wise to check the individual drug's interactions and side-effects.

Effect of drug	Examples
Increased lens deposit	Oral contraceptive, disopyramide, chlorpromazine, alcohol, make-up, aerosol sprays.
Lens discolouration	Rifampicin, sulfasalazine, tetracycline.
Corneal oedema	Oral contraceptive, digoxin, primidone.
Reduced eye movement/blink rate	Anxiolytics, hypnotics, antihistamines, muscle relaxants.
Reduced lacrimation	Oral contraceptive, antihistamines, antimuscarinics, phenothiazines, some betablockers, diuretics, tricyclic antidepressants.
Increased lacrimation	Ephedrine, hydralazine.
Conjunctival inflammation	Isotretinoin, salicylic acid.

Further reading & references

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