

# DRY EYES AND CONTACT LENSES

**Assessing both new and old patients at their pre-fitting examination is essential says Ian Pyzer**

**A**ssessing whether an individual has sufficient tear volume, and identifying whether it is of adequate quality, should form an integral part of the pre-fitting examination routine. This information may help you set the expectations of a new wearer on matters such as comfortable wearing time, frequency of disposability and material choice. For the current wearer, information relating to pre-existing symptoms of dryness including the effects of: environment, time of day, age of lens, solution changes, as well as details on their current lenses, will, along with the tear film assessment, build a picture which can help you decide on appropriate action when undertaking refitting. Along with assessment of the quantity and quality of the tear film, careful questioning of the

patient will reveal whether they take medications or suffer allergic reactions that may adversely affect the film, as well as gaining an understanding of the environments in which they will wear their lenses. Understanding whether a patient is marginally dry eyed, offers the opportunity for optimal management, so helping reduce discomfort and the risk of discontinuing lens wear. Of those who stop wearing lenses, 40.3 per cent do so due to discomfort.<sup>1</sup>

## History and symptoms

Gathering information from the patient is important and enables us to assess the potential level of 'dryness risk'. The following is a guide to the types of questions we could ask. Age: any systemic disease, arthritis, etc. Allergies and skin conditions: generally atopic,

hayfever, asthma, eczema, psoriasis. Medication: antihistamines, diuretics, beta-blockers, contraceptive pill. Working environment: air conditioning, computer, dust, smoke, fumes. Asking a patient to complete McMonnies questionnaire<sup>2</sup> is both quick and inexpensive and by using its scoring method, can highlight if a subject may be contact lens intolerant.

## The examination

### Tear volume

This can be measured in various ways, including Schirmer, Phenol red thread test and tear meniscus height measurement. While Schirmer is certainly still used in practice, it is unpleasant for the patient and the results often unreliable. The thread test is far quicker, requiring only 15 seconds rather than five minutes, but is still invasive and unwelcome by the patient. The preferred method is to assess the height of the inferior tear meniscus along the lower lid margin using a slit lamp graticule and magnification set to 30-40x. Care should be taken to keep illumination down to a minimum to reduce the likelihood of photosensitive reflex tearing which would affect the result, and should also therefore be undertaken at the start of the slit lamp routine using white light and prior to instillation of sodium fluorescein. A meniscus height of <0.25mm is considered abnormal, whereas between 0.25 and 0.35mm is normal<sup>3</sup> (Figure 1).

### Tear quality

Non Invasive Tear Break Up Time (NITBUT) is one of the simplest methods for determining whether or not the tear film is of sufficient thickness and stability. As the name implies, unlike invasive TBUT, it does not involve the instillation of fluorescein which can itself destabilise the delicate tear film<sup>4</sup>, but instead requires observation through either a single position keratometer where the mire quality can be assessed, the Loveridge Grid, which gives a more widespread image, or else an illuminated grid device such as that used with the Keeler Tearscope Plus. As the tear film thins and breaks post blink, the image will distort or blur (Figure 2). Where this occurs within 10 seconds this may be an indication of dry eye, and should generally be in excess of 25-30 seconds. NITBUT should be carried out following tear meniscus height evaluation and before any instillation of fluorescein, meibomian gland potency checks or lid eversion as all of these will otherwise affect the result. Unfortunately, tear break up time (TBUT) assessment cannot be taken in isolation as environmental effects such as air conditioning and smokey atmospheres will ultimately affect the tear evaporation rate. Reduced blink rate, either natural or induced (as often found amongst VDU workers) will also

have a detrimental effect on the pre lens tear film (PLTF) and hence the rate of lens dehydration. Part blinking, where the upper lid does not meet the lower lid, will prevent the continuous redistribution of an even, full thickness tear film across the cornea. The consequences of this may be clearly observed when a fluorescein slit lamp examination is undertaken. Often, a distinct junction exists where the normally wetting, non staining upper two thirds of the cornea meets the lower third, where superficial punctate staining develops as a result of the partial blinking. In the authors opinion, blinking exercises have little or no impact. Where partial blinking has developed over time due to poor comfort, ie in rigid lenses, refitting into an alternative design, or alternatively into soft lenses, may encourage complete blinking once again. However, should the patient continue with an incomplete blink reflex, the resulting corneal desiccation, can preclude them from comfortable lens wear. As it is the lipid layer that prevents the aqueous phase from evaporating, it is here that we pay specific attention when identifying possible causes of dry eye. Some opticians will have access to a Keeler Tearscope. This instrument uses interferometry by illuminating the tear film with a cold cathode light source while the observer views it through a non-illuminated slit lamp (Figure 3). Identifying tearscope findings and applying appropriate patient management technique is summarised in Table 1.

When a reduced lipid layer is noted, squeezing of the meibomian glands where this oil is produced, may reveal blockages or congestion termed meibomian gland dysfunction (MGD) (See Table 2).

Other signs of MGD are frothing of tears on the lid margin (Figure 4), notched tear meniscus and raised meibomian pores. Treatment requires application of a warm compress, followed by squeezing of the lower lid margin in small steps working from one end to the other and back again, this being repeated twice daily for 10 days. The upper lids are not squeezed as this could result in damage to the tarsal plate.

While inspecting the lid margins, check for meibomian seborrhoea or Blepharitis which causes scaly skin to accumulate around the lashes (Figure 5). It is often caused by staphylococcus bacteria whose exotoxins can disrupt the tear film resulting in dryness. Superficial punctate keratitis staining at four and eight o'clock or where the affected lid meets the cornea is often evidence of the existence of this condition (Figure 6). Blepharitis is usually resolved by using lid scrubs such as Lid Care or a mixture comprising six parts preboiled water to one part baby shampoo applied using a cotton bud or clean rough flannel

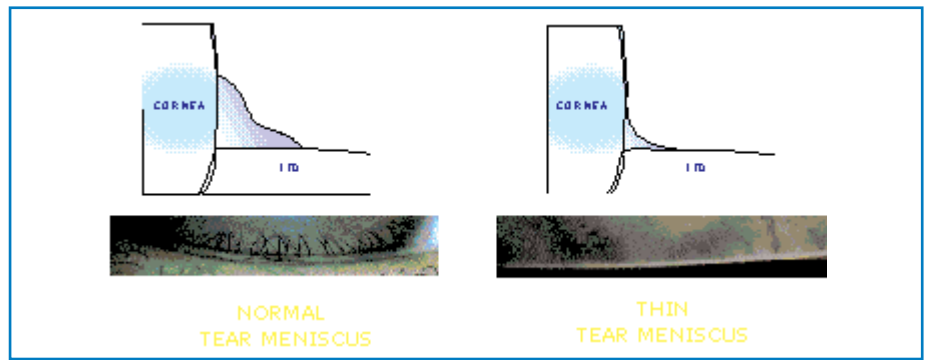


Figure 1.

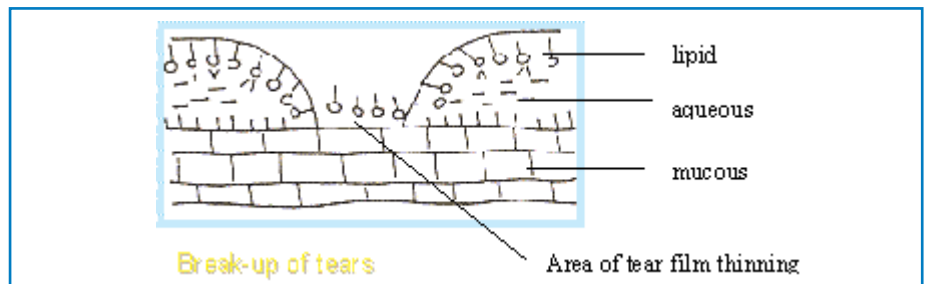


Figure 2.



Figure 3. [Copyright Keeler]

Type	Open meshwork	Closed meshwork	Wave/flow	Amorphous	Colour fringes
Appearance	Indistinct grey marble pattern; thin lipid (darker area thinnest)	Well defined dark grey marble pattern	Wavy, grey streak effect	Thick, white even, well mixed lipid layer; may see colours during blink	Thicker lipid layer; brown and blue interference fringes
Management	Treat meibomian gland dysfunction. Advise of possible evaporation problems	Suitable for contact lenses	Suitable for contact lenses	Ideal for contact lenses	Good candidate for contact lenses; possible tendency for lipid deposit
Thickness	10-20nm	20-40nm	40-80nm	80-90nm	>100nm
Population	15%	14%	29%	19%	17%

Table 1: Classification of meibomian gland dysfunction.

Table 2: Appearance of meibomian gland secretions.

Type	Appearance
Normal	Clear, easily expressed
Cloudy/granular colour	White/grey to yellow
Opaque	Semi-solid toothpaste consistency. Needs extra pressure
Blocked	None expelled

Figure 4.



wrapped around the finger.

### Fluorescein examination

Having checked meniscus height, checked NIBUT, used the tearscope and examined the lids, fluorescein can then be instilled. Where the bulbar conjunctiva exhibits staining (Figure 7), appears uneven, or has >grade 2 staining

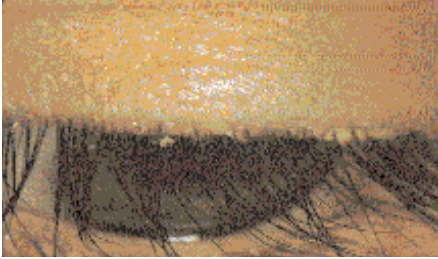


Figure 5.

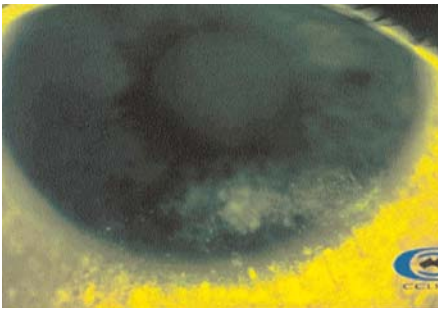


Figure 6.

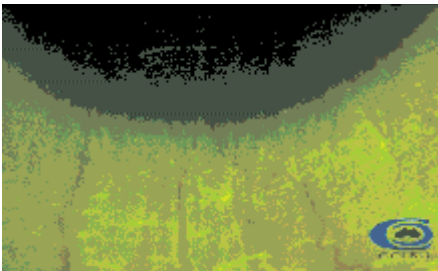
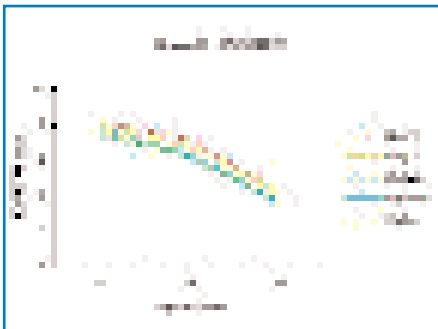
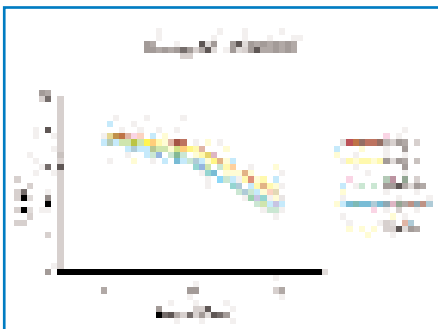


Figure 7.



Figures 8 & 9.



pingueculae before contact lenses are worn, this may be taken as a sign of potential dry eye.

In rigid lens wearers, the bulbar conjunctiva may become dry and irregular and the cornea prone to desiccation caused by the lids vaulting the lens edge in the three and nine o'clock areas. This may be remedied by reducing the edge thickness, decreasing the overall diameter and edge lift, or refitting with soft lenses and is often therefore unrelated to the patient's tear quality.

Incomplete blinking, where the upper lid repeatedly fails to meet the lower lid can result in inferior desiccation of the cornea. Causes may be due to: large bulbous eyes with tight lids, long term habit induced by discomfort in rigid lenses or sleeping with part open lids. Although soft lenses will cover the affected areas, comfort will depend upon there being sufficient tears to maintain hydration and so reduce/limit desiccation.

### Wettability - material or replacement frequency dependent?

Group 2 materials (Softens 66, Precision UV, Omniflex, ES70) are known to accumulate more lipid deposition than Group 4 materials which have a greater affinity for protein (Acuvue 2, Frequency 55, Focus Monthly, Surevue). All lenses will gradually deposit once inserted, which decreases wettability, which will in turn encourage further deposition. For this reason, a marginally dry eye patient will often deposit their lenses more rapidly.

Evidence of whether wettability is influenced more by our choice of material or by how often it is replaced can be demonstrated by the following research which shows that: (Figures 8 & 9)

- More symptoms of dryness with one month replacement as compared to two week replacement<sup>6</sup>
- No significant difference between group two and group four materials was found<sup>6</sup>
- When measuring pre-lens NIBUT (PLNIBUT), it was found that wettability dropped off significantly between day 14 - 28 (regardless of lens care solutions used)<sup>6</sup>

From this we may conclude that more frequent replacement schedules have advantages when comparing pre-lens wettability and symptoms of dryness. Symptoms of dryness and grittiness decreased from 35 per cent to five per cent when daily disposables were refitted to a group of patients wearing conventional daily wear lenses<sup>7</sup>. However, although this evidence suggests that 'shorter is better', if we are to maintain good wettability throughout the life of a contact lens, we know that marginally dry eye can affect comfort even when a new lens is worn, and that only by

changing materials or designs, can we improve wearer satisfaction. There is conflicting evidence that the higher water retentive properties of biomimetic materials, eg Omafilcon A (Proclear) from Biocompatibles Hydron translate into higher comfort levels for the wearer. In comparative studies<sup>8</sup> Omafilcon A (Proclear) was shown to dehydrate less than Etafilcon A<sup>8a</sup> (Acuvue). However:

- No correlation was found between the amount of dehydration and symptoms of dryness amongst the two groups
- Lenses dehydrated to a similar extent between the symptomatic and asymptomatic groups. In another such paper, the non-disposable Omafilcon A was found to exhibit less on eye dehydration than the disposable Etafilcon A lens, although comfort was not found to be significantly better<sup>9</sup>. Whether choosing to change to a biomimetic material, increase/decrease water content or opt for a thicker lens, a change may be all that is needed to reduce dryness symptoms. Commonly, it is accepted that a lower water content lens will dehydrate less than a higher water content lens. By opting for a design that is not too thin, dehydration can be minimised; however, maintaining a reasonable Dk/t is, of course, still important to maintain corneal health. In the authors opinion, Silicone Hydrogel materials may be worth taking a look at. Their combination of high Dk and low water content may offer an alternative when looking to overcome dryness problems, although being thicker and more mobile than conventional disposables will increase the chances of discomfort as well as the incidence of superior epithelial arcuate lesions (SEALS). Gas permeable materials can help, but a higher incidence of injection and exposure dryness problems often preclude their use. Choosing an RGP material with comparatively good wetting properties such as a fluorosilicone acrylate is advisable.

### Care regimes

Patients may report alterations to wearing time and experience symptoms of dryness or discomfort when changing from one regime to another, or after having been 'trouble free' for some time while using a particular solution. In instances where stinging or sensitivity after insertion from the lens case occurs, a change from one type of disinfection system to another could help, especially if the patient can report no such symptoms when using a fresh lens directly from its sterile packaging. In the authors experience, moving these patients from a multipurpose solution (MPS) to a peroxide based system or vice versa, can help isolate whether the symptoms are attributable to the solution. MPS systems differ in various aspects, including concentrations of preservative, addition of lubricant, type of surfactant

and buffering agent. With the exception of Optifree Express, all the available brands are preserved with Polyhexanide but involve different concentrations, so it helps to know how they differ when switching from one MPS to another.

Although we might expect the neutralised solution in 'one step' peroxide systems to be comparable to saline, stabilisers and unneutralised peroxide molecules can however, adversely affect a patient's comfort and wearing time. The launch of the first daily disposable in 1995 meant that for the first time, daily wear lenses could be worn without the complications and reactions that can be associated with lens care solutions. Rewetting drops can be proactively or reactively used but their success will be patient and environment dependent. There are both preserved and unpreserved varieties.

## Conclusion

With a careful approach, both the information provided by the patient as well as that gained from the slit lamp examination, will provide vital information to the optician. With this

information, providing the right advice regarding lens type, material and modality will be simpler, therefore leading to increased patient satisfaction and a reduced incidence of failure due to intolerance.

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