

# Management of Dry Eyes

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## **Introduction**

A Dry Eye (sometimes called *keratoconjunctivitis sicca*) is an eye where there are insufficient or inadequate tears to keep the front surface of the eye moist. Patients usually complain of grittiness or irritation which often worsens towards the end of the day

Dry Eye is a common condition, affecting 20% of the population, particularly as one gets older &/or in women after the menopause. The symptoms can be exacerbated by antihistamines, decongestants, some anti-depressants, and eye surgery such as LASIK. Patients with connective tissue diseases, such as Rheumatoid Arthritis or Sjögren's syndrome, may also present with Dry Eye. In its severest form, Dry Eye can lead to sight threatening corneal disease.

## **The normal tear film**

The normal tear film has three distinct layers: A lipid layer – produced by the Meibomian glands- which prevents evaporation; An aqueous layer which also contains proteins such as Lysozyme (which help to protect the eye from infection) and a thin, hydrophobic mucinous layer, which helps the tears to spread evenly over the cornea. Disruption to any of these layers can cause the symptom of dry eye.

## **Production of Tears & an Abnormal tear film**

Production of the aqueous layer depends on two forms of tear secretion: one, called a *basal tear secretion* (this keeps the eye moist regularly), the other, called *reflex tear secretion*. This occurs when the eye becomes irritable or in extreme emotion. It is possible for an individual to lose their basal tear secretion, making the eye irritable, and in turn produce reflex tears secretion. Thus it is possible that a dry eye may present paradoxically as a watery eye.

Additionally, in patients with reduced tear production, the concentration (osmolarity) of the tears increases, there may also be a slight reduction in tear PH. Tear stability can also be reduced due to a lack of water, fat or mucus and this can lead to exposure and damage to the underlying corneal cells.

## Symptoms of dry eye

As mentioned earlier a Dry eye presents with ocular irritation, burning & gritty pain. These are generally exacerbated by driving, reading / computers and central heating. They are typically worse in the evening and can lead to paradoxical tearing. A history of autoimmune or connective tissue disease or eye trauma or chemical injury can be contributing factors.

## Examination of the 'dry eye'

In patients with dry eye, the lids should be inspected carefully for signs of blepharitis, inflammation or poor function, e.g. Facial Nerve palsy, Trigeminal nerve palsy. There may be reddening of the eye particularly in the inter-papebral area. This can be highlighted by using Rose Bengal stain or with fluorescein dye. Filaments may be seen with these dyes and unstable tears can be noted with some magnification. A tear break up time of < 10 seconds is abnormal. Examination of the corneal may reveal small limbal white inflammatory deposits. The Schirmer's test, (using filter paper in the lower fornix) is useful to test aqueous production, a test of <5mm in 5 minutes is abnormal. Impression cytology of the goblet cells may also help in the diagnosis.

## Treatment of Mild Dry Eye

In order to relieve the symptoms of Dry Eye it is best to keep the eyes moist by instilling artificial tears. The amount of tears that are retained in the eye depends upon varying factors, such as the ambient temperature, the humidity and wind speed. As this may vary, from one environment to another, symptoms can vary significantly day-to-day and even within a day and between moving from one place to another.

Due to the rapid progress in this area, there are several treatments for Dry Eye, many of which are not been included in the BNF. However, before dispensing such therapy other factors to consider are:

- a. Treatment of underlying blepharitis
- b. Avoidance of dry / dusty / smoky environments
- c. Use of punctual plugs
- d. Increase omega-3 in diet
- e. Use of domestic humidifiers

## Eye Drops

Artificial tears act by increasing the aqueous volume of the tears, and reducing the osmolarity they only work while in contact with the eye. Hydrogels are added to increase the contact time with the eye these include: Hydroxypropyl Methylcellulose (HPMC), Carboxy Methylcellulose (CMC), Polyvinyl Alcohol (PVA), Carbopol, polyvinyl pyrrolidone, polyethylene glycol. The more viscous the drop the longer the benefit however blurring of vision can occur. A long acting ointment at night can also provide some relief particularly if there is poor lid closure.

## Preservative versus Un-preserved drops:

In general un-preserved drops are to be recommended, if sensitivity to Benzalkonium Chloride (BAC) occurs then the ability to treat glaucoma / infections are affected. BAC is the most commonly used preservative; however it can become an irritant with prolonged use. Preservatives like GenAqua (Sodium Perborate) and Polyquad (Polyquaternium-1) are less damaging to the eye surface than BAC. If frequent drops are needed then preservative free are recommended.

The drops have different actions some longer acting and some shorter.

Some drops have a longer action but can blur the vision (Celluvisc / Viscotears / Systane) some have a shorter duration of action. Some have a bicarbonate buffer (Systane / Isopto alkaline), others are hypotonic (TheraTears) others stabilize the lipid layer of the tear film (Endura). One (Restasis) drop acts by promoting lacrimal gland function by inhibiting inflammatory activity.

In mild dry eye a simple combination of environmental change with occasional, short acting drops may be all that is necessary. In moderate to severe dry eye a combination of drops & lubricating eye ointment may be necessary. In severe dry eye, careful assessment and moderation of every risk factor as well as meticulous treatment of eye symptoms and signs is vital to stabilize corneal health and prevent visual loss.

## Hypromellose

Hypromellose is a basic eye drop it increases the tear volume for a few minutes, however, its length of retention and action are relatively short, and is therefore only used in patients with very mild symptoms. It is widely used in the preserved form, however is better without the preservative.

### Drops

1. Hypromellose (Non-proprietary) Eye drops, Hypromellose 0.3%, preserved with BAK: **Price 10 mls = £2.04-**.



2. Minims® Preservative free Artificial Tears (Chauvin) Eye drops, hydroxymethylcellulose 0.44%, sodium chloride 0.35%. **Price 20 x 0.5 mls = £5.75**
3. Moorfields preservative free Hypromellose 0.3 % **Price 30 x 0.4ml £5.75.**



**Isopto plain 0.5% Hypromellose: Price 10ml 85p**



**Isopto alkaline Hypromellose: 1% 10ml 99p**

This is an standard eye drop preserved with BAC, with a minimally alkali buffered solution



**Liquifilm Allergan: Cost 30 × 0.4 mls pres free = £5.35 or 15 mls = £1.93**

This is a well tolerated drop using polyvinyl alcohol 1.4% it gives relatively short acting relief with minimal blurring of vision. Preservative is Benzalkonium chloride but is also available preservative free.



## TheraTears

24 x 0.6cc £9.99

Are hypotonic, so their use helps rehydrate dry eyes, the biogel used is carboxymethylcellulose, is good in combination with other drops such as Systane or Celluvisc. They can also be used in patients with contact lenses. For more information <http://www.theratears.com/>



## Celluvisc - Allergan

30 x 0.4 mls = £5.75.

Celluvisc is a viscous product that helps coat the anterior surface of the cornea. The Biogel used is



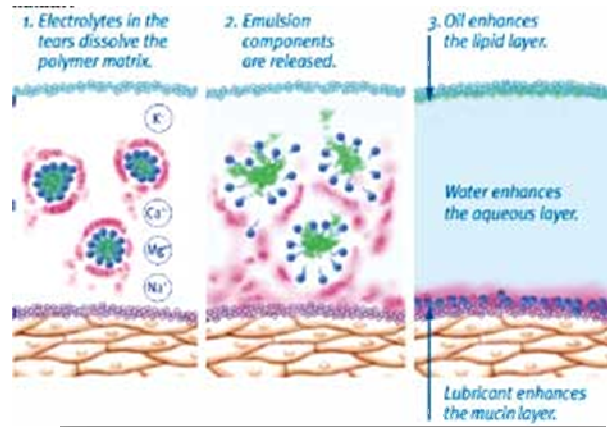
Carboxymethylcellulose (1% or 0.5%); it also contains sodium chloride, sodium lactate, potassium chloride, and calcium chloride. It is available in both preserved and unpreserved preparations. If used with contact lenses then the 0.5% is recommended since the 1% strength tends to leave a residue on the contact lens and blurs vision.

## Refresh Endura (non-BNF)

£13.00 20x4ml

[http://www.allergan.com/site/products/practitioners/home.asp?id=refresh\\_endura&largeText=](http://www.allergan.com/site/products/practitioners/home.asp?id=refresh_endura&largeText=)

This drop, is good in patients with Meibomian gland deficiency as it contains both, lipid (castor oil derivative), aqueous and glycerine and polysorbate polymer. The effective ingredients are released by contact with the tears. It has little blurring effect and a good duration of action.



For more information [http://www.revoptom.com/index.asp?page=2\\_888.htm](http://www.revoptom.com/index.asp?page=2_888.htm)

## **RESTASIS® (cyclosporine ophthalmic emulsion) 0.05% Sterile, Preservative-Free**

### **Description**

For patients with immune based dry eye – eg Sjögren’s, Rheumatoid arthritis, cyclosporine may have a role to play, although the exact mechanism is not known, it is thought to act as a T-cell immunosuppressant, improving lacrimal function by reducing autoimmune mediated inflammatory damage. Topical cyclosporine may take many weeks to achieve an improvement in lacrimal gland function. It has been found to be useful in other forms of dry eye such as following LASIK surgery.

This treatment is not available in Europe. Although it is licensed and widely available in North America & many patients obtain it via the internet.

### **Systane (non-BNF) <http://www.systane.com/>**

Systane contains a combination of Polyethylene Glycol 400, with Propylene Glycol and HP-Guar, which forms a protective gel and also adjust to each user's individual tear pH. It comes preserved with Polyquad more benign than BAK, has RCT data backing claims of effectiveness.



For more information

[http://www.crstoday.com/PDF%20Articles/0804/crst0804\\_thera.pdf](http://www.crstoday.com/PDF%20Articles/0804/crst0804_thera.pdf)