

DRY EYE PUNCTUM PLUGS David Crystal BSc MCOptom

Every waking second your eyes produce tears containing natural infection fighting antibiotics. Blinking spreads this over the eye's surface before being sucked through two small holes in the nasal corner of your eyelids. These are the tear duct openings or puncta that drain tears to the nose and throat.

If your tear glands make insufficient tears, or they drain away too quickly, the tear film is spread too thinly over the eye's surface. If your tear glands produce enough tears but are of poor quality, they evaporate too quickly before the next blink comes along. Either way dry spots appear and cause irritation.

How are Tears Produced?

Glands located at different places around the eye form the eye's tear film. Tears have three layers: oil, water and mucous.

1. The mucous layer connects with the eye's surface and serves as an anchor for whole tear film. Its made by goblet cells which are embedded in the white of the eye and inner lid surfaces.
2. On top of the mucous layer sits the watery layer, which comes from the lacrimal gland just below the eyebrow. During waking hours, the lacrimal gland pumps watery tears at a background level adjusting for environmental conditions. When there is an irritant, extra "crying" tears are made almost instantly. This is why as odd as it sounds many Dry Eye sufferers experience watery eyes - the lacrimal gland overcompensates for irritation caused by an abnormal tear film. Lacrimal gland activity is lowest during sleep and this why eyes feel very dry upon waking.
3. Sitting on top of the watery layer, the oily layer seals the tear film by preventing evaporation. This oil is exuded from 23 Meibomian gland openings along the edge of the eyelids. Meibomian gland dysfunction causes deficiency in tear oils and dry eyes by evaporation. Blocked glands require hygiene measures.

Can Dry Eye Damage My Eyes?

Yes. If untreated, damage to the outer protective tissue of the cornea opens a route of infection with the risk of permanent scarring and sight loss.

What Causes Dry Eyes?

The list of lifestyle factors that can dry out your eyes is almost endless...

The Eyecare Trust is a registered charity that exists to promote awareness of all aspects of eye health. For more information call our public information line on 0845 129 5001 or log on to www.eyecaretrust.org.uk



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- Central heating, air conditioning, dehumidifiers, hairdryers, car windscreen demisting, altitude; air travel, dry climates, wind, air pollution, saunas, spicy foods, alcohol, contact lenses; and activities that decrease blink rate, such as driving, watching TV, computers and reading, all increase tear evaporation as well.
- Although Dry Eyes can be a side effect of disease, the most common cause is normal ageing. In fact, the volume of lubricating background tears is less than half at age 65 than at age 18. Not surprisingly then, Dry Eye affects one in five people over 55, but some more than others. People with wider eyes; those with larger than average tear duct openings and people taken dehydrating medicines are worse off...
- Antidepressants, decongestants, antihistamines, blood pressure medication, diuretics, ulcer medication, tranquillisers, beta blockers, oral contraceptives can all dry out your eyes.
- Amazingly, many artificial tear drops commonly prescribed for Dry Eye contain agents which disrupt goblet cell production of tear mucous. These can actually make a dry eye worse with time.
- Several diseases result in secondary Dry Eye Syndrome: Rheumatoid Arthritis, Thyroid Abnormalities, Asthma, Sjogren's Syndrome, and Lupus.
- For younger women: Hormonal changes brought on by pregnancy, lactation, oral contraceptives, menstruation, and post-menopause can cause dry eye conditions.
- Laser Eye Surgery - dry eye is a confirmed side effect.

How Are Dry Eyes Treated?

You should have an examination to determine whether you actually have dry eyes and if so which type. Around 80% of patients have dry eyes due to lack of tear volume (aqueous deficiency) and 20% have dry eyes by evaporation from defective tear oils where plug treatment is inappropriate. In evaporative dry eyes, a different treatment is prescribed. Many patients have both aqueous and evaporative components to their dry eye, so tests are needed.

Fact sheet

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A fluorescent yellow dye is painlessly introduced into the tears of each eye. Viewed with a microscope under blue light, any area on the surface of the eye damaged by dehydration glows brightly.

Tear evaporation rate is counted as the number of seconds after a blink before the tear film de-stabilises and tear volume assessed by analysing the "pool" of tears clinging along the edge of the lower eyelids. The dynamic flow of tears over the surface of your eye following a blink and the size of your tear ducts are also noted.

Do not accept anything less than a microscopic examination - it is the only way to make the diagnosis!

Depending on the cause, Dry Eye Syndrome can be treated as a temporary problem or a long-term condition. Either way, tears must be conserved or supplemented in order to provide relief.

Short-Term Relief by Tear Supplements

For less severe dry eye cases, artificial tears offer immediate relief. Unfortunately, many widely used bottles of eye drops contain preservatives, which can cause a worsening of the dryness with time. These agents affect goblet cell production of the mucous tear layer and some patients develop low-grade allergies. New technology lubricants (hypotonic, unpreserved and non-newtonian) work but are not available in the UK. There really is nothing better than human tears.

Long-Term Relief by Conserving Tears.

In cases of more persistent dry eye symptoms, closure of the tear duct openings, may be the best option. This conserves precious tears by restricting drainage. Your eyes are bathed with your own natural tears without the bother of constantly supplementing the tear film with artificial drops.

Trial Closure of the Tear Ducts - Collagen Plugs

If your dry eye has an evaporative component to its cause, the case for closing the tear ducts is not clear-cut. For these patients, trial dissolvable plugs are fitted where the patient returns one week later for assessment of their experience.

A cotton bud soaked with anaesthetic is held over the tear duct and a tiny dissolvable collagen plug is painlessly inserted into your lower tear duct. The

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entire procedure is performed in an optometrist's office in a few minutes. Many patients report immediate comfort.

Collagen plugs dissolve within one week. If during this test period you experience relief from dry eye symptoms, you may wish to proceed with the long-term comfort afforded by permanent tear duct closure.

Permanent Closure of the Tear Duct with Plugs

Closing the tear drainage ducts makes a lot of sense. In effect your own natural tears treat your own dry condition. Unless you have purely evaporative dry eye, plugs will help - it's just a question of by how much. Some patients find they can stop using eye drops altogether.

Punctal occlusion, the medical name for closing the tear duct, can be achieved by

- Laser "welding" Reversible - NO
- Cauterisation "burning" Reversible - NO
- Non-dissolvable silicone punctum plugs Reversible - YES

Punctal plugs act very much like a stopper in a sink. Placing a tiny silicone insert into the tear duct prevents precious tears being lost. As the tear reservoir builds - the self-lubricating process begins.

Plugs are the least invasive of the long-term solutions to dry eye with a very high rate of success. They can be inserted easily and painlessly and are medically inert. They can easily be removed if too much tearing is produced in the event your dry eye condition improves at a later date. They are ideal in contact lens cases.

Different plug designs are available in a range of sizes so each patient requires individual assessment.

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