

PATIENT HANDOUT: Dry Eye Disease (DED)

- *Dry Eye Disease occurs when the normal flow of tears over the eyes is interrupted, or the tear film is abnormal.*
- *Dry eye affects one in five people.*

What are Tears?

- Tears are one of the body's natural defense mechanisms. They are produced by various glands in the eye and are secreted to coat, protect and nourish the surface of your eye.
- Tears carry essential vitamins and nutrients across the surface of the eye. They also act as a shield against damaging factors such as wind, heat, smog or foreign particles.
- Normally, every time you blink, you add another protective coating of tears over the eyes whilst flushing out old tears.

Layers of the Tear Film:

There are three layers of the tear film.

- The innermost layer is the Mucin layer. Mucins are proteins produced by the cells of the conjunctiva (the clear skin lining the eye). Their function is to bind the watery layer of the tear film (aqueous) evenly on the surface of the eye.
- The middle layer is the Aqueous which is the thickest, comprising of 90% of the tear film volume. It is produced by the lacrimal gland and accessory tear glands around the eye. This aqueous layer helps provide moisture to the eye for comfort, but also acts to flush out debris and foreign particles with each blink.
- The outermost layer is the Lipid (oil) layer is quite thin and its main function is to reduce evaporation of aqueous.

How do I know if I have dry eye disease?

Did you answer YES to any of the following? If you did, you are likely to have some form of dry eye.

- Do your eyes look healthy and relatively white?
- Do your eyes feel healthy?
- Do you find that sometimes vision is not clear and other times it is?

Symptoms:

Dry eye symptoms can include one or more of the following conditions:

- Burning
- Stinging
- Grittiness
- Scratchiness, grittiness or a "foreign body" sensation
- Dryness
- Itching

- Sensitivity to bright light (photophobia)
- Mucous secretions in the eye (can be soft, dry or string-like discharge)
- Watery eye
- Fatigue
- Blurred or fluctuating vision

Types:

1. **Aqueous Deficiency DED** – due to reduced secretion of tears from the lacrimal gland.
2. **Evaporative DED** – due to excessive tear film evaporation from the ocular surface. Common causes include
 - Meibomian gland dysfunction (blocked oil-producing glands)
 - Posterior blepharitis (eyelid inflammation)
 - Lid aperture and lid/globe disorders (leads to reduced ability to blink adequately to coat the ocular surface). Common conditions include stroke or Bell's palsy which makes closing the eyelid difficult.
 - Low blinking rate.
 - Vitamin A deficiency
 - Allergy
 - Contact lens wear
 - Tear film instability
3. **Mixed Aqueous and Evaporative DED**

Other causes:

There are a number of risk factors that can lead to dry eye. These include but are not limited to:

- Digital device use
- Preservatives contained in some bottled products for use in the eye, such as eyedrops or artificial tears. Frequent use of these products can aggravate dry eye conditions.
- Medications (antihistamines, antidepressants, diuretics, psychotropics, cholesterol lowering agents, beta-blockers, oral contraceptives, arthritic)
- Systemic disease (such as Diabetes, thyroid disease, rheumatoid arthritis, systemic lupus erythematosus, rosacea, hepatitis C infection, HIV infection, Sjogren's syndrome, sarcoidosis) can lead to abnormal tear production
- Age (weakened immune system)
- Gender (post menopausal females are a large risk group due to decrease in hormonal levels leading to loss of anti-inflammatory protection)
- Poor diet (low water intake, excess caffeine and/or alcohol intake, low amounts of fatty acid intake etc)
- Asian ethnicity
- Heating/cooling systems (decreases humidity)
- Changes in hormone (chronic androgen deficiency, menopause and hormone replacement therapy)
- Cancer (systemic chemotherapy, radiation therapy)
- Previous eye surgery (such as refractive surgery, corneal transplantation)
- Previous eye injury (eg chemical burns) or infection
- Irregularities of the conjunctival surface (outer white layer of eye) such as pingeculae or pterygia

Diagnosis:

Your optometrist will diagnose Dry Eye by taking a thorough targeted history, as well as evaluate:

- tear production
- tear evaporation
- quality of the tear film and its components
- quality of lid margins and eyelashes

Diagnostic tests for dry eye disease include:

- Schirmer's test
- Phenol red thread test
- Tear film break up time
- Staining tests: Fluorescein, Lissamine green
- InflammDry MMP testing
- TearLab Osmolarity System
- Tearscope analysis

Treatment:

While there is no known cure for Dry Eye Disease, you can relieve the symptoms of dry eye. Most eye care practitioners recommend artificial tear products (ocular lubricants) for their patients with Dry Eye. Generally speaking, to help ease symptoms of Dry Eye some simple measures can be taken. These include the following:

First line of action:

1. Wear wraparound sunglasses when you are outdoors to help keep out wind, glare and dust.
2. Avoid spending prolonged periods in air-conditioned or heated environments as this can cause a higher rate of evaporation, resulting in dry eyes. Consider using a cool-air mist humidifier at home.
3. Avoid smoking, and avoid smoky environments.
4. Get plenty of sleep.
5. Eat more fresh fruit and vegetables, particularly foods rich in Vitamin A, C and E. Reduce the intake of processed, salty or deep fried foods to maintain a healthy balanced diet.
6. Liquid consumption: Drink the equivalent of 8-10 glasses of water (~2L) per day to keep the body well hydrated. Avoid beverages and foods which have diuretic effects such as coffee, caffeinated teas (less than 2 cups), alcohol (less than 1 standard drink) etc.
7. Nutritional supplements: consume 3g to 4g per day of Omega-3 fatty acids to decrease ocular surface inflammation, increase tear production and improve meibomian gland secretions. Dietary sources of Omega-3 include fatty fish, such as salmon and tuna. **Flaxseed Oil or Chia Seed** are suitable vegetarian alternatives.

TheraTears Nutrition capsules contain a blend of Flaxseed oil and Fish oil. They contain a high quality source of Omega-3 essential fatty acid and have been clinically proven to support eye comfort and healthy tears through reducing inflammation. **Lacritec** nutrition capsules contain a blend of Omega-3 essential fatty acid from fish oil and flaxseed oil, and plant-based Omega-6 essential fatty acids from Borage oil;

all of which reduce ocular inflammation. Moderate dry eye patients should take 2 tablets/day; severe dry eye patients should take 3 tablets/day.

Fish oil supplements can take 4-8 weeks to become effective. General pharmacy Omega-3 capsules are generally less potent than supplements manufactured for dry eye nutrition.

8. Consider discussing with your GP about the possibility of altering or decreasing the use of medications that can lead to dry eyes. Common culprits are antihistamines and antidepressants.
9. Whilst reading, watching television or working on the digital devices (computer screens, tablets, mobile phones), remember to consciously blink frequently and take regular breaks.
10. Make sure the eye lids and oil glands around your eyes are functioning properly. Tears evaporate very quickly if there is not enough oil covering the tear layer. There are a few things you can do and products that you can use to improve the health of your eyelids and oil glands.
 - a. Use warm compresses on closed eyes for 8mins followed by eyelid massaging for 2mins, to help loosen any blockages in the oil glands. Do this twice a day for a month, then twice a week for maintenance. Using a warm face towel is not recommended as the heat cannot be maintained at an optimum temperature for more than 3minutes. Commercial warm compresses available include **Eyegiene**, **TranquilEyes** or **Bruder Eye Compress**.
 - b. Squeeze your lower eye lid (close to the root of the eye lashes against the eye ball to make sure none of the oil glands are blocked). Apply 20 presses around the eye (both top and bottom of the lid).
 - c. Use commercial lid cleaners to clean the eyelids before sleep every night. If you wake up in the morning with crusty eyes then perform another clean then. Commercial products available include: **SteriLid Eyelid Cleanser**, **Systane LidWipes**, **Blephadex eyelid foam cleanser**.
 - d. In some cases, an **antibiotic** (eye drop/ointment) is prescribed to reduce the bacterial population in the eye area. Excess bacteria can lead to evaporative dry eyes, as they break down the oily layer of the tear film.
 - e. Use lipid (oil) based tear supplements (**Systane Balance** or **Optive Advance** eyedrops, or **TearsSpray**) for evaporative (meibomian gland) dry eyes. Use Systane Ultra, Systane Gel, Systane Hydration or Optive eyedrops for Aqueous deficiency dry eyes. Where possible, choose non-preserved options for lubricants.
 - f. Alternatively for longer relief, **Optimel Antibacterial Manuka honey eye gel** used twice a day are excellent; however it stings! When using Manuka honey eye gel, have the eyes closed for 5 minutes after applying a small dab. A weaker concentration is available in the form of eyedrops; this is suitable to use during work/school, as they only sting for a second.
 - g. In severe Dry Eye, you may be asked to instil additional eye ointment such as **Polyvisc** or **Refresh Night Time Eye Ointment**. These will apply a thick coating over the eye's surface to keep it moist and reduce evaporation whilst you sleep. They are generally not used during the day as they can cause temporary blurry vision.

Persevere with these steps as it may take up to 6-8 weeks for the symptoms of dry eye to be managed.

Second Line of action:

- Blephasteam is a thermal steam goggle treatment. It is used to warm the oil glands to an optimal temperature for several minutes to liquefy harden oils. This is followed by manual in-office Meibomian (oil) gland expression. Generally 3-4 treatments per patient are required initially on a monthly basis. Additional treatments are performed as needed.
- Use topical non-preserved corticosteroid **Prednisolone 0.5%** eyedrops for one month to reduce inflammation to both types of DED. Steroid drops are not to be used in excess due to side effects namely cataract formation and raising eye pressure that may lead to glaucoma. Typically steroid drops are used four times a day for two weeks, then twice a day for a further two weeks.
- Non-steroidal eyedrops (**Voltaren, Acular**) can also be used to reduce inflammation.
- Use immune-suppressing eyedrops (eg **Cyclosporine-A 0.5% and 1%**, ie. Restasis) to reduce inflammation to both types of DED.
- Topical antibiotics: erythromycin ointment has both antibiotic and anti-inflammatory effects. It is prescribed for use at night and effective for MGD.
- Oral antibiotics particularly **Tetracycline and Doxycycline** helps to reduce the bacteria population. Bacterial flora is responsible for breaking down oil and inhibiting oil production. These antibiotics also help reduce inflammation. Doxycycline has fewer side effects than Tetracycline. Patients with ocular rosacea are particularly responsive to Doxycycline. A recent study showed that oral **azithromycin** (250mg/day) taken for 5 days was more effective than oral doxycycline 200mg/day taken for 30 days.
- **Punctal occlusion** uses a silicone plug to decrease loss of tears through the drainage system, keeping more tears on the ocular surface. It acts like a stopper placed in a drain of a sink. This is particularly useful in cases of Aqueous deficiency dry eyes, or in cases of MGD where active ocular surface inflammation has been resolved, for retaining more tears on the ocular surface for moisture. It is usually only recommended after the eyes have been treated with immunosuppressive drops for 3 months.
- **Meibomian gland probing** (MGP) for Evaporative dry eyes. Tiny metal probes are used to break fibrous adhesion at the opening of the duct and within the duct. This procedure is done by a handful of eye specialists for severe cases of meibomian gland blockages.
- **Moisture chamber spectacles** increase humidity around the eyes by increasing the oil layer of the tear film.

Third Line of action:

- **Autologous serum eyedrops** (ASEDs) – are eyedrops made using a patient's own blood. Serum contains similar chemical properties present in natural tears that are not available in artificial tears, which promote ocular surface healing. They are typically applied four times daily.
- **Therapeutic contact lenses** – extended wear silicone-hydrogel contact lenses are used in cases where there is severe surface damage, discomfort and blurry vision.
- **Permanent punctal occlusion** – thermal cautery is done to permanently seal the drainage hole.
- **Mucolytic therapy** – if mucous strands or filaments cause severe discomfort, topical N-acetylcysteine can be made at compounding pharmacies (usually as 10-20% aqueous solutions). When used three times daily over two weeks, the condition is usually resolved.

Forth Line of action:

- **Systemic anti-inflammatory medications**
- **Surgery** (lid surgery, tarsorrhaphy; mucous membrane, salivary gland, amniotic membrane transplantation).

Long-term treatments:

Intense Pulse Light (IPL) Therapy

- This uses brief bursts of light (not laser) to melt meibomian gland secretions and stimulate the nerves to the meibomian glands. IPL closes abnormal blood vessels that release inflammatory components into the eye. After IPL therapy, in-office therapeutic meibomian gland expression is performed for increased effectiveness.
- The use of IPL to treat dry eyes was first used (pioneered) by Dr. Rolando Toyos in USA in 2002. France Medical E>eye IPL device obtained Australian TGA approval in 2013. Dr. Brendan Cronin, an ophthalmologist in Brisbane has been using the E>eye IPL machine since Jan 2014.
- The effects of IPL are cumulative as the number of treatments increase. Three treatments are recommended (Day 1, Day 15 and Day 45) with an additional treatment a month later for longer effectiveness. After this, patients should have a maintenance treatment every 6 months. According to the E>eye IPL website, the study showed 86% improvement in patients after 3 treatments.

LipiFlow

- This is a thermal pulsation system that has shown to be very effective at clearing blocked oil glands. The treatment involves placing an eyecup over a closed eye. The device works by gently warming and simultaneously massaging the lower eyelids.
- According to the LipiFlow website, a dry eye study reported 79% of patients showing a 10-100% improvement in their dry eye symptoms at 4 weeks after treatment. One treatment can last 9-12 months and sometimes longer.

Both these treatments can be used together for increased effectiveness.

Useful links

www.australiandryeye.webs.com

www.dry-eyes.com.au

www.arthritisaustralia.com.au

www.rosacea.org

www.sjogrens.org.au

www.blephasteam.com

www.theratears.com/dry-eyes/how-theratears-can-help/nutrition

www.lacritec.com.au

www.tranquileyes.net.au

www.bruder.com/eye/documents/literature-eye-compress.pdf

<http://www.dryeyesolutions.com.au>

www.melcare.com/optimel.html